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JOHNSON (R. A.). **Preservation of wooden poles.**—*Elect. Engr Merch.*, xvii, 1, pp. 17–18, 2 figs., 1940.

The 'sand-creosote collar' method for the preservative treatment of wooden poles at the ground-line, developed and adopted by the Hydro-Electric Power Commission of Ontario and fully described in *Elect. Engr Merch.*, xvi, pp. 219–221, 4 figs., 1939, is stated to be also giving excellent results at Glebe Island, Sydney, New South Wales, where impregnated poles of the Maritime Services Board are still in a sound condition after five years' service. A two piece galvanized iron cylinder fastened with slides, allowing an annular cavity of about 1 in. all round the pole and extending 12 in. below the ground and 6 in. above it, is filled with creosote-saturated sawdust, re-treatment with ½ gal. of the preservative being necessary every two years. After back-filling with impregnated sawdust, the top is finished off with a tar compound, through which are inserted the re-treatment filler caps.

KNOTT (J. E.). **The response of Onions to manganese on unproductive peat soils.**—*Proc. Amer. Soc. hort. Sci.*, xxxvii, pp. 803–806, 1 fig., 1940.

Onions growing on unproductive peat soils in New York State show a yellowish cast of the leaves, a dying-off at the tips, and dwarfing. The condition was rectified by applications of manganese sulphate at the rate of 100 lb. per acre; without manganese the plants gradually died so that at harvest there were many missing plants in the rows. The cost of the treatment is much less than that of the ton or more of sulphur necessary to bring about a comparable improvement. Treatment can be delayed until the limits of the unproductive area are apparent. When the soil is dry the manganese sulphate should be applied in solution.

LEWIS (R. W.). **A method of inducing spore production by Cercospora apii Fries in pure culture.**—*Phytopathology*, xxx, 7, p. 623, 1940.

The following method was devised by the writer for the inducement of conidial production in *Cercospora apii* [cf. *R.A.M.*, xiv, p. 195; xix, p. 228] at the Michigan State College. Celery leaflets were placed in contact with sterilized slightly moistened soil (muck, compost, or sand), 2 cm. deep, in an Erlenmeyer flask, the whole sterilized by 20 minutes' autoclaving, and the leaflets used as a substratum for the mycelium of the fungus, which produced typical conidia in six days. The conidiophores, however, were abnormal, the distances between the geniculations amounting to hundreds of microns as compared with 10 to 30 μ

in field specimens. Old cultures (three years in one case) were equally prolific with new isolations in respect of conidial formation by this technique but cultures that had lost their characteristic colour yielded no spores.

WORMALD (H.) & HARRIS (R. V.). **Notes on plant diseases in 1939.**—*Rep. E. Malling Res. Sta., 1939*, pp. 58–62, 1940.

These notes [cf. *R.A.M.*, xviii, p. 654] contain the following items of interest. Injury, in some cases fatal, to young apple trees, associated with waterlogged conditions of the soil, and known locally as 'the death' [ibid., xvi, p. 540], was reported from a number of localities. Orchards subject to waterlogging should be well drained, and young trees securely staked to prevent excessive movement of the stem in strong winds. Raspberries growing on a very unsuitable soil were also affected by the same condition.

Williams' pear and Benn's Red apple trees from Suffolk and pear shoots from Kent showed 'papery bark' [loc. cit.], a condition probably induced by a sudden upward flow of sap.

The circular spotting of apple leaves known as 'Cox spot' because of its prevalence on Cox's Orange Pippin apples was very severe in some plantations; it is attributed to drought. A spotting of Czar plums, 'Czar spot', is considered to be probably due to the same cause; the lesions somewhat resemble those caused by bacterial attack, but are generally larger, and have a pale halo. Experimental evidence showed that 'dwarf lateral scorch' of raspberries [ibid., xvii, p. 688] and die-back of loganberries result mainly from imperfect breaking of the winter rest period owing to insufficient exposure to cold in winter.

A reddish discoloration distributed marginally or, more usually, as scattered spots on the leaves of Royal Sovereign strawberries and somewhat resembling severe crinkle was ascertained to be due to soil and weather conditions unfavourable to the normal development of new root fibre.

Stereum purpureum was found fructifying on posts in a garden and on a walnut tree cut back to induce shoot production.

Cox's Orange Pippin apples received towards the end of December showed circular, sunken areas $\frac{1}{5}$ to 1 in. in diameter, some bearing *Gloeosporium album*, others *Trichothecium roseum*, and all containing in the centre a lesion due to scab [*Venturia inaequalis*], the first two fungi clearly having effected entry through the injuries caused by scab.

Early in September, many leaves on a plot of Wellington's XXX black currants bore large discoloured patches due to *Botrytis cinerea*. Most were found near the margins, and many affected the terminal lobe, suggesting that infection had begun at the apical tooth, where water would tend to accumulate and favour attack.

Exceptionally severe infection by *Leptosphaeria coniothyrium* in 1938 caused widespread death in 1939 of fruiting raspberry canes in trial plots, the varieties mainly affected being Newburgh, Preussen, Viking, and Red Cross.

Blossom blight of sweet cherries (accompanied by infection of the leaves, fruit, and fruit stalks) was associated with an organism probably identical with *Pseudomonas mors-prunorum* [ibid., xviii, p. 689].

Hop downy mildew [*Pseudoperonospora humuli*: ibid., xviii, p. 818] did not cause much trouble, partly owing to dry weather in early summer and partly because routine spraying is now widely practised. Nettlehead [ibid., xix, p. 364] was widespread and very destructive.

WITTE (H.). **Redogörelse för verksamheten vid Statens centrala frökontrollanstalt under tiden 1/7 1938–30/6 1939.** [Report of the work of the State Central Seed Testing Station for the period from 1st July, 1938, to 30th June, 1939.]—*Medd. Frökontrollanst. Stockh., 1940*, 15, pp. 3–62, 1940.

The following items of phytopathological interest occur in this report. Ergot [*Claviceps purpurea*] was detected in 53 and 24 per cent., respectively, of the rye and six-rowed barley samples submitted for inspection. Sclerotia [? of *Sclerotinia trifoliorum*: *R.A.M.*, xviii, pp. 299, 684] were present in 23 per cent. of the Swedish red clover [*Trifolium pratense*] samples examined, in 20 lots of foreign red clover, in 12 of alsike [*T. hybridum*], in 5 of white clover [*T. repens*], and in 3 of hop lucerne [*Medicago lupulina*]. *Ustilago bromivora* was found in 16 out of 91 samples of brome grass [ibid., xvii, p. 505]. Of the 8,817 cereal seed-grain samples analysed for *Fusarium* contamination, the 676 subjected to seed treatment were to all intents and purposes clean: among the remainder very severe, severe, less severe, mild, and very mild infection occurred in 0·4, 3·7, 7·3, 21·2, and 46·5 per cent., respectively. Garden peas were extensively infected by *Ascochyta pisi*, beans [*Phaseolus vulgaris*] by *Gloeosporium* [*Colletotrichum*] *lindemuthianum*, and beets by *Phoma betae*.

Plant diseases. Notes contributed by the Biological Branch.—*Agric. Gaz. N.S.W.*, li, 8, pp. 439–442, 4 figs., 1940.

In August, 1939, glasshouse tomatoes in New South Wales were widely affected by streak [cf. *R.A.M.*, xix, p. 372], first recorded locally in 1933 [ibid., xiv, p. 348]. The disease is most pronounced in winter, and the lower sets of fruit may be so badly disfigured when picked in September that their market value is negligible. The affected leaves bear irregular, often angular, dead areas, and longitudinal brownish streaks are frequently present on the midrib and veins on the under surface. Narrow, sunken streaks are found on the stems, while the fruits show irregularly shaped, angular, brownish spots of widely different dimensions, generally sunken, and usually scattered over the whole surface. [These symptoms agree with those of single virus streak: ibid., xvi, p. 348.] In the glasshouse spread occurs rapidly, especially during pruning, the virus being readily transmitted by workers' hands. Outdoor crops are seldom attacked. The tomatoes should be frequently inspected during winter, and all affected plants removed and destroyed. The hands should be washed before handling healthy plants. Seed for planting should be taken only from healthy vines.

As was expected on chemical grounds, shirlan AG, being stable in solution, has proved compatible with Bordeaux mixture, nicotine sulphate, lead arsenate, and colloidal sulphur in tests by various growers. After shirlan AG has been diluted for spraying it can safely be kept for some time before use.

A note is given on the control of tuber-borne potato scab [*Actinomyces scabies*] and *Rhizoctonia* [*Corticium solani*] by dipping in mercuric chloride, 1 in 1,000 plus 2 pints of hydrochloric acid per 25 gals. This solution may safely be used for 15 treatments of 10 minutes each. If the period of immersion is then increased to 15 minutes the solution will remain effective for a further five dippings, after which it should be discarded. Dipping may be effected some months before planting, and should be carried out before the tubers begin to sprout, and before cutting. Treated potatoes should be promptly dried.

DEIGHTON (F. C.). **Mycological work.**—*Rep. Dep. Agric. S. Leone, 1938*, pp. 64–66, 1939. [Received October, 1940.]

The following are among the items of interest in this report [cf. *R.A.M.*, xviii, p. 156]. During 1938 the incidence of citrus scab (*Sphaceloma fawcettii*) [*Elsinoe fawcetti*] was again very low, severely and lightly affected trees being dealt with by burning and pruning, respectively. Another record of pink disease (*Corticium salmonicolor*) on grapefruit was received from Port Loko, while the same fungus, in association with *Hypomyces haematococcus*, was observed on this host at Jaiama.

The uredo stage of *Uromyces appendiculatus* was found on French beans (*Phaseolus vulgaris*) at Yengema, this being the first record for the Colony, another new record for which is *E. canavaliae* on *Canavalia ensiformis* [ibid., xiii, p. 345] in the same locality.

An Asterinaceous fungus mentioned in the 1936 report as pathogenic to pineapples in two localities has been identified as *Asterinella stuhlmanni* [ibid., xvii, p. 161].

Other diseases include a rot of soursop [*Annona muricata*] probably caused by *Colletotrichum anonicola*, and leaf spots of *Crotalaria juncea* (*Cercospora demetriana*), *Hibiscus sabdariffa* (*C. hibisci*), tomato (*C. nicotianae*), and *Petunia* (*C. physalidicola*), all previously reported as *C. canescens* [cf. ibid., xv, p. 344], *C. brassicicola* on Chinese cabbage, *C. stizolobii* on *Stizolobium niveum* [*Mucuna nivea*], and *C. subsessilis* on *Melia azedarach*. The fungus previously reported as a *Piricularia* on *Solanum* spp. has now been identified as *Eriomycopsis tenuis*, a parasite of a common *Schiffnerula* on *Solanum*.

NANCE (NELLIE W.). **Diseases of plants in the United States in 1938.**—*Plant Dis. Reptr, Suppl.* 119, 289 pp., 12 graphs, 8 maps, 1940. [Mimeographed.]

The present survey of the diseases affecting cereal, fodder, fruit and nut, industrial, tree, ornamental, and miscellaneous crops in the United States in 1938 closely follows the lines of previous summaries covering the same ground [*R.A.M.*, xix, p. 7], the value of which is pointed out in an introductory note to be largely cumulative, a comparison of the conditions prevailing in different years being of much interest and importance.

MILBRATH (D. G.). **Bureau of Plant Pathology.**—ex *Rep. Calif. Dep. Agric., 1939* (*Bull. Dep. Agric. Calif.*, xxviii, 10), pp. 567–577, 1940.

In this report [cf. *R.A.M.*, xvii, p. 797] it is stated that, as a result

of the enforcement of celery-free periods in the Venice District and an area comprising approximately the western half of Ventura County, California, western celery mosaic [ibid., xviii, p. 369] has been so far brought under control that in 1939 the average yield per acre, locally, over an area of 1,200 acres amounted to 1,100 crates per acre, as against 311 crates in 1934. In some instances yields of 1,600 and 1,800 crates per acre were obtained, and the total value of the crop exceeded $1,000,000, in spite of very low market prices. The disease was also reported from the Sacramento–San Joaquin Delta in 1939, and a celery-free period was accordingly proclaimed from 6th until 23rd February, with the result that the yield averaged 220 crates per acre, as against 110 in 1938.

Bacterial ring rot [*Bacterium sepedonicum*: see below, p. 725] is present in about 95 per cent. of the Californian potato-growing areas, including Siskiyou, San Joaquin, Inyo, Madera, Tulare, Kern, San Benito, Santa Barbara, and Riverside Counties. The absence of the disease along the northern coast from Two Rock, Sonoma County, to the Oregon boundary, is due to the fact that in this area the crop has for many years been produced from locally grown seed. Laboratory examination of samples from incoming lots at Bakersfield during a period of three months showed 14 per cent. of all the lots examined to be affected.

In 1939, 8,372 peach trees were found to be affected with mosaic [ibid., xix, p. 227] in California compared with 17,847 in 1938, and 34,000 in 1937. Between 1936 and 1939, inclusive, 89,355 mosaic trees were found, and 63,651, or 71 per cent., removed.

Deglet Noor date palms developed decline due to *Omphalia* root rot [*O. pigmentata* and *O. tralucida*: ibid., xix, p. 590]; at present the most suitable method of control would appear to consist in the isolation of healthy individual palms and the certification of their offshoots.

Federal surveys of sugar pine [*Pinus lambertiana*] and *Ribes* stands disclosed no new centres of infection by white pine blister rust [*Cronartium ribicola*: ibid., xviii, p. 562]. Infected pines have been located in three places in California, the range of infection extending about 14 miles south of the Oregon border. That no appreciable spread occurred in 1939 is attributed to a reversal in the direction of the usual air currents; it is regarded as only a temporary phase in the situation.

Grapes were affected by a condition referred to as Pierce's disease, resembling that prominent from 1880 to 1900 and then known as California vine disease; numerous foci of infection appear to exist. One vineyard of 1,690 Emperor vines was rogued extensively from 1936 to 1939; in the former year it contained 1,279 healthy and 390 affected vines, while in the latter the corresponding figures were 1,648 and 22.

Laboratory investigations demonstrated that crown gall [*Bact. tumefaciens*] does not occur naturally in soil, and virgin soil may be considered to be free from it. It accumulates rapidly, however, in soil, and survives for at least two years.

Cherry crinkle [ibid., viii, p. 550] has increased in recent years as a result of the selection of budwood from affected orchard trees. By a discriminating selection from clean parent trees the disease could be largely avoided in nursery stock.

HARRIS (H. A.). **Comparative wilt induction by Erwinia tracheiphila and Phytomonas stewarti.**—*Phytopathology*, xxx, 8, pp. 625–638, 2 graphs, 1940.

In studies on the wilts of cucumber (*Erwinia tracheiphila*) and maize (*Phytomonas* [*Aplanobacter*] *stewarti*) at the University of Illinois, a decrease in the transpiration losses of plants affected by both diseases was observed during the initial stages of infection. Fluometric determinations by the method of Melhus *et al.* [*R.A.M.*, iv, p. 234] showed that the reductions in the flow of water through the stems amounted to 82 per cent. in the case of the former disease, and to 74 per cent. in that of the latter. The filtrates of both organisms from beef extract broth solutions induced wilting of cucumber and maize cuttings and the wilting was equally rapid with autoclaved filtrates. A mechanical plugging of the water-conducting system appears, from the transpiration and fluometric data obtained in these experiments, to be the primary cause of the bacterial wilts of cucumber and maize.

JOHNSON (T.) & NEWTON (MARGARET). **The influence of light and certain other environmental factors on the mature-plant resistance of Hope Wheat to stem rust.**—*Canad. J. Res.*, Sect. C, xviii, 8, pp. 357–371, 1 fig., 1 diag., 1940.

In greenhouse experiments at Winnipeg, carried out during 1936 and 1937, the relative influence of environmental factors on the mature-plant resistance [*R.A.M.*, xix, p. 585] of the wheat variety Hope to race 21 of *Puccinia graminis tritici* was studied. A comparison of plants grown in ordinary daylight with those shaded by a covering of two-ply cheesecloth inducing 60 per cent. reduction in light intensity, showed in the latter a slight tendency towards increased susceptibility. The shaded plants were softer, less rigid, and had a higher moisture content than the unshaded. Plants receiving six hours of light daily were found to be more susceptible than those given ten hours, the least susceptible being those grown in full daylight for the period of the experiment (February to June). The mature-plant resistance broke down in plants grown and kept after inoculation at constant high temperatures (75° to 80° F.), developing infections averaging, in numerical values according to the scale of 0 to 24 devised by Goulden *et al.* [ibid., x, p. 170] 16·5 on the leaves and 15·8 on the stems, whereas plants kept at ordinary greenhouse temperatures (55° to 80° daily) developed infections averaging only 5·4 and 7·5, respectively. Plants grown in soil receiving a full nutrient solution were slightly less resistant than those in the unfertilized series, but in no instance was there a breakdown of mature-plant resistance, suggesting that this type of resistance is not readily influenced by the application of fertilizer. The results obtained in this study are not considered sufficiently consistent to explain the nature of mature-plant resistance. A daylight period such as that prevailing in Peru or Kenya would be insufficient of itself to account for the breakdown in mature-plant resistance in Hope and similar varieties in these regions. It would appear, however, that there is an inherent tendency in Hope wheat to acquire resistance to stem rust as the tissues become mature, and that very subnormal light conditions, moderately high temperatures, and other factors exert a repressive influence on this process.

PETERSON (R. F.). **Inheritance of resistance of H–44 and Hope Wheats to stem rust.**—*J. Hered.*, xxxi, 6, p. 272, 1940.

In connexion with a recent account by E. B. Babcock (*J. Hered.*, xxxi, pp. 132–133, 1940) of the chronology of Hope and H–44 wheats, developed by E. S. McFadden (*J. Amer. Soc. Agron.*, xxii, pp. 1020–1034, 1930) from a cross made in 1916 between Marquis wheat and Yaroslav emmer, the writer briefly refers to the early work of Goulden, Neatby, and Welsh [*R.A.M.*, viii, p. 29] an abstract of which was published in *Anat. Rec.*, xxxvii, p. 182, 1927, on the mode of inheritance of these varieties to stem rust [*Puccinia graminis*] and to other outstanding American contributions on the subject.

COTTER (R. U.). **Unseasonable germination of teliospores of Puccinia graminis tritici.**—*Phytopathology*, xxx, 8, pp. 689–691, 1940.

During the past ten years none of the teleutosori of all the available races of *Puccinia graminis tritici* collected in Minnesota in the late summer or early autumn and kept outdoors over winter have given rise to germinating spores before March of the following year. However, barberry plants inoculated on 2nd October, 1939, with teleutospores of the rust from a Colorado collection on *Elymus* and *Agropyron* contracted heavy infection, which also resulted from mid-November inoculations of the same host with teleutospores from *A. smithii* collected in Colorado after the first collection. Race 8 of *P. graminis* was identified from the material of both lots, the teleutosori in which had evidently been formed in the late summer of 1939. In further tests, two out of five barberry plants inoculated in early November with teleutospores from durum wheat collected in Minnesota developed severe infection and one showed mild symptoms, the other two remaining healthy. The rust culture contained race 44 of *P. g. tritici*. Varying degrees of infection also occurred on 12 out of 15 barberries inoculated at 4- to 6-day intervals in early December. Teleutospores of the rust collected in Minnesota on Marquis wheat and Bond oats showed very little viability compared with those from durum, only a few pycnidia developing from inoculations with these collections.

The cause of this exceptional behaviour is not apparent, but it is evidently not associated with alternate wetting and drying or freezing and thawing [*R.A.M.*, xi, p. 230], the autumn of 1939 having been one of the driest on record for the State, with an abnormally high mean temperature.

COTTER (R. U.). **An unusual telial collection of Puccinia graminis.**—*Phytopathology*, xxx, 8, pp. 693–695, 1940.

When teleutospores of a collection (No. 7990) of *Puccinia graminis* on *Agrostis* from Minnesota were used to inoculate barberry [see preceding abstract], aecidiospores resulted which were capable of infecting barley. This uredospore culture proved to be race 11 of *P. g. tritici*, an unexpected result since the original collection was not on wheat. Crosses between this *Agrostis* collection and *P. g.* vars. *tritici*, *secalis*, and *agrostidis* yielded other races of *P. g.* vars. *tritici*, *secalis*, and possibly one of *agrostidis*. One of the *tritici* races (160) from a cross with *P. g.*

var. *secalis* was different from any previously identified. The identity of the *Agrostis* collection was not indisputably established, but it was either var. *agrostidis* or a hybrid so different from the other vars. of *tritici* or *secalis* as to be unable to attack barley.

SHEN (C. I.). **Soil conditions and the Fusarium culmorum seedling blight of Wheat.**—*Ann. appl. Biol.*, xxvii, 3, pp. 323–329, 1940.

In studies on the seedling blight of wheat caused by *Fusarium culmorum* [*R.A.M.*, xvii, p. 229], carried out at the Imperial College of Science and Technology and Rothamsted Experimental Station by means of the glass tumbler technique [ibid., xviii, p. 172], the intensity of infection was found to be correlated with the density of the spore suspension used to inoculate dry seed, the disease rating (expressed as a percentage of the maximum possible incidence) increasing from 56 to 91 as the concentration of spore suspension was raised from 220 to 166,000 spores per c.c. This correlation was much less significant and the intensity of infection much lower when seed was soaked for 48 hours prior to inoculation and planting. An increase in the period of presoaking from 42 to 66 hours did not reduce the infection any further. It was found that the infection was unable to extend along the seminal roots, so that its spread can only be explained by the growth of the fungus through the soil. In allotment soil, the infection decreased from a disease rating of 100 at a soil moisture content of 30 per cent. saturation to 28 at one of 80 per cent., the corresponding decrease in sand of the same moisture contents being from 91 to 55. The intensity of infection was lowest at P_H 7·3 in sand culture and 6·4 in soil and increased in both when the P_H was lowered to 4·4 or raised to 8·1. In nutrient sand culture, infection was highest (disease rating 57) in the no-nutrient series and lowest (33) in that receiving the full nutrient solution (nitrogen, phosphorus, and potassium). The addition of nitrogen, either alone or in combination with phosphorus or potassium, was almost as effective (33, 34, and 37, respectively) in reducing infection as the full nutrient solution; phosphorus, either alone or with potassium, was markedly less effective (41 and 46, respectively); while potassium did not significantly reduce infection below the no-nutrient series (55).

VANTERPOOL (T. C.). **Present knowledge of browning root rot of Wheat with special reference to its control.**—*Sci. Agric.*, xx, 12, pp. 735–749, 2 figs., 1940.

In view of the increasing economic importance of the browning root rot of spring wheat (*Pythium* spp., chiefly *P. arrhenomanes* and *P. tardicrescens*) [*R.A.M.*, xix, p. 586] in the Canadian prairies, a review is given of the present knowledge of the disease with special reference to its control. It is pointed out that the constant cropping resulting from the grain and fallow system practised over wide areas of western Canada leads to an increased liability to browning root rot in the wheat crop following fallow. Since it has not been possible to devise a method of completely eliminating the pathogens in the soil, and since, furthermore, none of the common wheat varieties is immune from this disease, control measures must mainly aim at improving soil conditions so as to help the development of more vigorous seedlings. In the author's

experiments, practical control resulted from the application of ammonium phosphate (11–48), at the rate of 0·5 gm. per pot, to naturally infested field soil at the time of sowing, reducing the percentage of diseased crown roots to 48·1 from 61·9 in the control, and increasing the plant weight by 205·2 per cent. The increases obtained with small applications of ammonium phosphate were much greater than those from heavy applications of gypsum and sulphur, and the commercial use of the latter compounds is, therefore, not to be considered at present. Some evidence was obtained of the effect of triple superphosphate on the crown root development, indicating that there is no significant difference in the date of first appearance of crown roots between treated and untreated plants, but that subsequent growth in length is substantially increased in the former during the first few days. Nitrogenous fertilizers are of little or no value, if not actually harmful, when applied alone to phosphate-deficient soils, but once the phosphate deficiency is rectified, nitrogenous amendments are beneficial. The ploughing-under of crop residues partially alleviated the trouble and the value of non-cereal rotations, i.e., lucerne or sweet clover, is primarily due to the improvement in soil fertility they effect. Farm manure was the only organic material among those tested which gave adequate control comparable to that obtained with the phosphates, and its use before fallowing is consequently recommended as one of the major control measures. The importance is also stressed of using sound, clean seed of the most resistant varieties obtainable, of early and shallow sowing in a firm seed-bed, and of the control of wild grass weeds. It is emphasized that results of lasting value can only be obtained when the depletions in soil fertility and the lack of nutrient balance brought about by the present wasteful grain and fallow system of cropping are corrected.

Tapke (V. F.). **Studies on the natural inoculation of seed Barley with covered smut.**—*J. agric. Res.*, lx, 12, pp. 787–810, 5 figs., 1940.

The inspection at the Arlington Experiment Farm, Virginia, of a number of lots of seed barley naturally infected by covered smut (*Ustilago hordei*) showed the most effective inoculum to consist, not of spores on the seed hulls [*R.A.M.*, xvii, p. 677], but of spores and extensive mycelial ramifications from germinated spores on the pericarps of the caryopses below the seed hulls. The occurrence of this inoculum beneath the hulls under natural conditions doubtless accounts for the repeated failure of attempts to combat the disease by superficial treatments with various fungicides. Moreover, the deep-seated infection underlying the hulls, unlike the superficial inoculum on the exterior of the seed, is highly resistant to cold after emergence.

A field study of spore dissemination and seed inoculation in 1935–6 on the Han River, Cusado, and Wisconsin winter varieties showed that all the covered smut spores are not held intact in the infected heads until threshing, as generally reported. A few days after the emergence of the smutted heads, the membranes enveloping the spores begin to split, thereby permitting early spore dissemination and the prompt inoculation of developing seed in sound heads. These processes are repeated throughout the growth, ripening, curing, and drying of the

standing and shocked grain, culminating only with the completion of threshing. All the spores reaching the seed do not lie dormant on the surface of the hulls until sowing, some settling beneath the hulls, or sending infection hyphae into this site, or both. Spores reaching the seed during threshing may also send infection hyphae beneath the hulls under certain conditions of moisture during storage, so that the activity of the pathogen beneath the hull may extend from the time of emergence of the heads until the sowing of the new crop.

In a further study on storage conditions, progressive increases in the atmospheric humidities (from 0 to 15 drops water per 1 pint jar) in which inoculated Norway C.I. 2535 seed-grain was stored resulted in corresponding rises in the incidence of smut (from 60·9 to 87·5 per cent. in an untreated lot and from 0 to 28 per cent. in one disinfected with copper carbonate dust) up to a point at which mould growth on the seed became conspicuous.

Two different types of emergence of covered smut heads are described, in one of which the heads fail to reach the auricles of the flag leaf and remain half enclosed in the boot, while in the other (chiefly represented by the standard winter varieties) they are fully exserted. Intermediate and irregular types have also been observed. It would appear from preliminary investigations that the variety, the physiologic race of *U. hordei* concerned, and the environmental conditions of the plants are factors involved in the different types of smutted head emergence.

Elliott (Charlotte) & Poos (F. W.). **Seasonal development, insect vectors, and host range of bacterial wilt of Sweet Corn.**—*J. agric. Res.*, lx, 10, pp. 645–686, 2 graphs, 1940.

In continued studies on the bacterial wilt of maize (*Aplanobacter stewarti*) [*R.A.M.*, xv, p. 573], data on the incidence of the disease were collected in several localities in the United States during a period of four years. At the Arlington Experiment Farm, Virginia, bacterial wilt was abundant (60 to 80 per cent. of the susceptible Golden Bantam variety being infected) and destructive in the years 1934, 1935, and 1937, in which the winter temperature was slightly below the normal mean of 35·1° F. (but well above 32°), slightly above normal, and above 40°, respectively, while in 1936, when the mean winter temperature was below 32°, there was little infection in the early leaf stage, and even later, when the disease had become general, most of the lesions did not develop beyond local leaf infections. Adults of *Chaetocnema pulicaria* were abundant early in the season in 1934, 1935, and 1937, but in 1936 they were much less abundant in May and June, gradually increasing in numbers and becoming numerous by the middle of August.

At Geneva, New York State, wilt was completely absent in 1936, when the mean winter temperature was below 32°, but in 1937, when it was well above 32°, 11 per cent. of the Golden Bantam plants were infected. On three occasions no specimen of *C. pulicaria* was found in 1936, although small numbers of this insect were probably present late in August, while 57 specimens of the beetle were collected in late August 1937, 18 per cent. of which proved to be infected with *A. stewarti* [ibid., xix, p. 467].

At Yonkers, in the same State, 9 per cent. of Golden Bantam plants

(3 per cent. of which were killed) were infected in 1935; in 1936, no wilt was found by the middle of June on 700 Golden Bantam plants, and only 4 per cent. was present by the middle of August; in 1937, 5 per cent. were infected early in the season and 99 per cent. when the plants were mature. On Long Island there was little wilt early in the season of 1936 but an abundance later. In 1937 there was more early wilt than in the previous year. The mean winter temperature for 1936 was below 30° and for 1937 above 38°.

In four years' tests with 28,769 insects representing 94 species belonging to 76 genera, *C. pulicaria* proved to be the only species of importance harbouring the wilt organism during winter and spreading infection during the growing season in the field. *C. denticulata* ranked next to *C. pulicaria* in numbers of adults from which *A. stewarti* has been isolated, but it is doubtful whether the wilt organism ever overwinters in adults of this species. The proportion of infested *C. pulicaria* beetles was greater when the insects were caged on infected maize than when they were collected in the field, from 60 to 95 per cent. of the caged beetles yielding the organism in 1935. The wilt organism was isolated from *C. pulicaria* beetles collected at the Arlington Farm in every month of the year, giving fresh proof that the organism overwinters in hibernating adults of this beetle. Similar data were obtained in other localities. *Euchlaena perennis* was found to be an additional host of the wilt organism.

Sansom (T. K.). **Breeding Diplodia resistant varieties of Maize.**—*Rhod. agric. J.*, xxxvii, 8, pp. 442–444, 1940.

Diplodia disease of maize [*D. zeae* and *Gibberella saubinetii*: *R.A.M.*, xix, p. 642] is prevalent throughout Rhodesia, where infection may reach 100 per cent. in some crops, the amount developing depending on the season and the locality. Severity is greatest in the best maize-growing areas, and no variety grown locally shows any high resistance. In Matabeleland incidence is less than in Mashonaland, where the rainfall is heavier, but in a very wet season in Matabeleland the Hickory King, Salisbury White, and Potchefstroom Pearl varieties may be as severely infected as in Mashonaland.

Selections have been made from crosses between the white dent variety, Johnson's County White, and a good type of Salisbury White; tests made with seed of this hybrid in a season very favourable to spread gave only 2 to 9 per cent. infection, the former figure being obtained from a flinty grain of the type on which selections are based. Commercial seed samples seldom contain under 50 per cent. diseased grains. Preliminary trials suggest that this hybrid will also equal the standard white dent varieties in yield. Further improvement of the variety is being attempted and seed is not available for distribution at present.

Wager (V. A.). **The navel-end-rot, splitting, and large-navel-end problems of Washington Navel Oranges in the Kat River Valley.**—*Sci. Bull. Dep. Agric. S. Afr.* 192, 20 pp., 12 figs., 1939.

Navel-end rot of oranges due to the fungus *Alternaria citri* [*R.A.M.*, xix, p. 401] was investigated in the packhouse and the field from 1936 to 1938 in the Kat River Valley, South Africa, where it has been present

with varying degrees of intensity for many years and has at times caused serious losses. It was noticed early in the investigation that many of the infected oranges had large (over 0·3 in. diam.), malformed, irregular shaped, or protruding navel ends. Of the infected oranges collected at the rate of 80 to 100 weekly from the packhouse, 88 per cent. of 400 fruits in 1936, 66 per cent. of 800 in 1937, and 77 per cent. of over 600 in 1938, had large navel ends. In 1936, the 80 trees under observation showed an average of five infected fruits per tree, of which 90 per cent. had large navel ends. In 1937, the 1,000 trees under observation showed an average of 7 infected fruits per tree, 60 per cent. of which had large navel ends. In 1938, the same 1,000 trees had an average of 15·1 infected fruits per tree, of which 76 per cent. had large navel ends. These results demonstrate the importance of large navel ends in connexion with the development of navel-end rot. A more serious problem than navel-end rot, which was shown to affect only about 6 fruits per tree in a normal season, is presented by split fruits, which occurred at an average of 11, 22, and 34 fruits per tree in various orchards during 1937 and 1938. Without exception, split oranges had large navel ends.

It has previously been found that *A. citri* and also quite frequently *Fusarium lateritium*, *Colletotrichum gloeosporioides*, and various other fungi could be isolated from healthy mature oranges [loc. cit.]. In order to investigate the conditions under which navel-end rot develops, oranges in all stages of ripeness were wounded with a knife and inoculated with dry spores of *A. citri*, half the wounds being deep, penetrating the juice sacs, and the other half shallow. In all deep wounds, typical rot developed, extending to the core of the fruit, while in none of the shallow wounds did the fungus penetrate through the rind and reach the flesh of the fruit. Similar results were obtained with *F. lateritium* and *Oospora citri-aurantii*, rot developing only when the wound pierced the flesh of the fruit. It is concluded that the fungus can pass from one juice sac to another but cannot pierce the white tissue. It usually enters the navel end of the young fruit shortly after the style dehisces and can become deep-seated between the primary and secondary ovaries, but it appears to grow, spread, and produce navel-end rot only in those cases where it comes into contact with a juice cell. In oranges with large navel ends this may occur more often, as the pressure producing the cracks at the navel end may also rupture a juice sac and the juice might reach and stimulate the development of the fungus.

Field observations showed that large navel ends are mainly due either to harsh weather conditions when the fruit is 0·2 to 0·3 in. in diameter or to probably abnormal water relationships when the fruit is over 1·5 in. The problem of navel-end rot thus appears to resolve itself into one of cultural practices designed to prevent the formation of large navel ends.

MAYNE (W. W.). **Report on comparative trials with perenox carried out at Balehonnur and Sidapur in 1939–40.**—*Plant. Chron.*, xxxv, 17, pp. 345–347, 1940.

In an experiment at Balehonnur, Mysore, in November, 1939, the effective leaf survival of coffee bushes sprayed against *Hemileia vastatrix* [*R.A.M.*, xix, p. 470] with 2–2–40 Bordeaux mixture was 42·3 per cent.

compared with 33·1 and 29·6 per cent. for perenox [cuprous oxide; ibid., xix, p. 454] in concentrations of 3⅓ and 1¼ lb. in 100 gals., respectively. In another test at Sidapur in September, 1939, the leaf survival figures for the perenox (3⅓ lb.) and Bordeaux-treated plots were 55·1 and 54 per cent., respectively, while in a further series in April, 1940, the corresponding percentages for the two treatments were 35·8 and 30·5, respectively. The conflicting results of these trials, which preclude any definite appraisal of the relative merits of the two fungicides pending further observations, may possibly be explained on a meteorological basis, perenox having been more effective in the relatively dry climate of Sidapur than under the very humid conditions prevailing at Balehonnur.

Otero (R. O.). **Experimentos sobre adherentes para fungicidas.** [Experiments on adhesives for fungicides.]—*Rev. cafet. Colombia*, viii, 105, pp. 2605–2606, 1940.

A tabulated account is given of the writer's experiments in 1937 to determine the relative merits of different adhesives used to supplement the standard fungicidal sprays for the control of coffee diseases (*Cercospora coffeicola* and *Colletotrichum coffeanum* [*Glomerella cingulata*]) in Colombia. The best results were given by the addition of lubricating oil to 5–6–50 Bordeaux mixture at the rate of 250 c.c. per 30 l., but a substantial degree of control was also effected by treatment with Bordeaux mixture at the same strength plus castor oil (300 c.c. per 30 l.), honey (1 or 2 lb. per 50 l.), or joiner's glue (½ lb. per 50 l.), and by the 4–4–50 concentration with the admixture of rosin soap (100 c.c. per 30 l.).

Hare (J. F.) & King (C. J.). **The winter carry-over of angular leaf spot infection in Arizona Cotton fields.**—*Phytopathology*, xxx, 8, pp. 679–684, 2 figs., 1940.

Evidence is presented showing that the causal organism of angular leaf spot of cotton (*Phytomonas* [*Bacterium*] *malvacearum*) is capable of surviving the winter on seed left unpicked in the field, the percentages of infection in a greenhouse test in the seedlings produced by two lots of Acala seed collected from (*a*) old stalks and (*b*) the ground being 34·4 and 30, respectively, compared with 0 in another lot from a disease-free field. From these volunteer seedlings infection may be transmitted to the planted crop by means of irrigation water or wind-driven rains. Thus, in five experimental fields in 1939 the percentages of infected volunteer seedlings were 9·3, 57, 16·6, 35·7, and 15, respectively, and those of diseased leaves (on 23rd September) 100, 31, 100, 28, and 100, respectively, the corresponding figures for the stems being 52, 8, 33, 15, and 83, and for the bolls 11, 2, 10, 3, and 25, respectively.

This mode of spread may be counteracted by such practical measures as turning cattle on the fields after the harvesting of the crop, raking and burning the plant debris, and early cultivation to destroy the volunteer seedlings before irrigation [*R.A.M.*, xviii, p. 520].

Neal (D. C.) & Brown (H. B.). **Fusarium-wilt resistance of new strains and hybrid Cottons in Louisiana in 1939.**—Abs. in *Phytopathology*, xxx, 8, p. 705, 1940.

The maximum degree of resistance to cotton wilt (*Fusarium*) [*vasin-*

fectum: *R.A.M.*, xix, pp. 403, 592] in the Louisiana trials of 1939 were (in the order named) Delfos 925–425 (with only 0·4 per cent. infection), Dixie Triumph 06–366, Deltapine 12, Dixie Triumph 85, Dixie Triumph 62×D. & P.L. 10–44–531–62, and Miller 610, of which Deltapine 12 was the highest yielder and Dixie Triumph 85 the lowest; the highly susceptible Half and Half showed 87 per cent. infection. Stoneville 3–68, though moderately susceptible (25·5 per cent. infection), ranked third in the production of seed cotton.

Smith (A. L.). **A regional study of the relationship of potash treatments to the development of Cotton wilt under widely varying conditions of soil and environment.**—Abs. in *Phytopathology*, xxx, 8, p. 707, 1940.

A combined summary of the results of two seasons' experiments (1937 and 1938) in 13 localities of nine States of the American Union to determine the effect of treatment with potash (32 and 64 lb. potassium oxide per acre) on the incidence of wilt [*Fusarium vasinfectum*] and yield in 12 cotton varieties [see preceding abstract] indicates significant reduction in the numbers of diseased plants and substantial increases of production for both potash levels as compared with the untreated control series; the increase of yield following the 64 lb. application was not, however, significantly greater than that of the 32 lb. Furthermore, the yield response of susceptible varieties was insufficient to counteract the losses from wilt. Diseased plants showed reduced staple length and seed weight and an increase in lint percentage as compared with healthy ones. Relative divergences in varietal susceptibility to infection in different localities seems to be partly due to variations in the extent of nematode infestation.

Watkins (G. M.) & Watkins (Matilde O.). **A study of the pathogenic action of Phymatotrichum omnivorum.**—*Amer. J. Bot.*, xxvii, 4, pp. 251–262, 54 figs., 1940.

This is a full account of the authors' work on the root rot fungus *Phymatotrichum omnivorum*, a preliminary note on which has previously been noticed [*R.A.M.*, xix, pp. 147, 592]. The conclusion is reached that exudates from the mycelium of the fungus contain thermo-labile substances, probably enzymes, which are largely responsible for the destruction of cell walls in inoculated cotton, retama (*Parkinsonia aculeata*), and maize seedling roots.

Wolcott (G. N.) & Martorell (L. F.). **Epidemics of fungus disease control insect pests in Puerto Rico.**—*J. econ. Ent.*, xxxiii, 1, pp. 201–202, 1940.

Of a large consignment of *Thermesia* [*Anticarsia*] *gemmatilis* collected from a completely defoliated planting of velvet beans [*Mucuna deeringiana*] at the Isabela Substation, Puerto Rico Agricultural Experiment Station, in the autumn of 1939, over half were found to have been killed by a fungus identified by Vera K. Charles as *Spicaria rileyi* [*R.A.M.*, xv, p. 719] which, though developing too late to save the crop, destroyed all the caterpillars of the last instar.

A previous instance of insect control by a fungus in Puerto Rico dates

from 1923, when the cottony cushion scale, *Icerya purchasi*, was practically eliminated by *S. javanica* from certain citrus groves well protected by hills and bamboo windbreaks.

Charles (Vera K.). **An entomogenous fungus on Spider Mites on Water Hyacinth.**—*Mycologia*, xxxii, 4, pp. 537–540, 1940.

During the winter of 1938–9, the author observed in Florida a species of *Rhinotrichum* on spider mites (*Paratetranychus yothersi*) on the common water hyacinth *Piaropus* [or *Eichhornia*] *crassipes*. The fungus was confined to the insects, and did not spread over the surface of the leaves or penetrate the tissue of the plants. The mites were enmeshed in a fine web of white mycelium, in which many of them were dead. The parasitism of the fungus was established by placing leaves infested by active mites in paper bags, in which condition the fungus grew rapidly on the exterior and interior of the mites, all of which were dead in 18 hours.

The fungus, which is characterized by repent or suberect sterile hyphae, ascending, flexuous, closely septate fertile hyphae, 75 to 200 (or longer) by 1·5 to 2 μ, sometimes slightly enlarged below the septum, an ovate-conoid and sporiferous terminal cell, and ovoid, smooth, hyaline conidia, 2·5 to 3 by 1·5 to 2 μ, borne on sterigmata 1 to 2 μ long, along the whole length of the conidiophore, is named *R. depauperatum* n.sp. [with English and Latin diagnoses].

Drechsler (C.). **Three new Hyphomycetes preying on free-living terricolous Nematodes.**—*Mycologia*, xxxii, 4, pp. 448–470, 3 figs., 1940.

Full descriptions [with English and Latin diagnoses], are given of three new species of Mucedinaceous Hyphomycetes subsisting by the capture of free-living terricolous eelworms [cf. *R.A.M.*, xix, p. 593] and belonging to the same series as those discussed in an earlier paper [ibid., xvii, p. 36], viz., *Dactylella doedycoides* n.sp., *D. haptospora* n.sp., and *Tridentaria implicans* n.sp. In the author's previous paper the fungus which should have been given as *Dactylaria brochopaga* appeared, by a slip of the pen, as *Dactylella brochopaga* [ibid., xviii, p. 251].

Davis (W. A.). **Aspergillosis in wild Herring Gulls.**—*J. Bact.*, xl, 2, pp. 321–323, 1 fig., 1940.

Aspergillus fumigatus was isolated from the lungs and other internal organs of five wild herring gulls (*Larus argentatus* var. *smithsonianus*) out of over 60 found dying or dead near the East Boston airport, Boston Harbour, and cultured on Sabouraud's agar at 37° C., the identification being confirmed by C. Thom. The birds are thought to have acquired the disease as a result of feeding for several months on decaying vegetation.

Mitra (A. K.). **Otomycosis in a woman caused by Aspergillus niger Tieghem.**—*Curr. Sci.*, ix, 8, pp. 371–373, 1940.

Aspergillus niger was isolated from the ear of a 48-year-old woman [*R.A.M.*, xix, p. 654] at Allahabad and grown on a number of standard media, of which potato dextrose agar proved to be the most suitable. A point of interest in connexion with the primary phialides of the fungus

was their decrease in length from 25 to 35 μ in the original habitat to 15 to 20 μ in culture. Treatment with alcohol failed to effect a cure [ibid., xviii, p. 313].

Cronkite (A. S.) & Lack (A. R.). **Primary pulmonary coccidioidomycosis: experimental infection with Coccidioides immitis.**—*J. exp. Med.*, lxxii, 2, pp. 167–173, 2 pl., 1 diag., 1940.

Following a brief review of the literature on inhalation infection with *Coccidioides immitis* [*R.A.M.*, xix, p. 594], the writers describe a laboratory technique for the inoculation of animals by this method, which produced primary pulmonary infection in 30 (42 per cent.) of the 72 guinea-pigs used in experiments at the Stanford University School of Medicine, San Francisco. Spherules were usually present in the older lesions, but not in the earlier ones, at which stage the process of transition from the chlamydospore to the spherule is still in progress and cannot be followed without the aid of a differential stain not at present available.

Barnshaw (H. D.) & Read (W. T.). **Rhinosporidiosis of the conjunctiva.**—*Arch. Ophthal., N.Y.*, xxiv, 2, pp. 357–361, 2 figs., 1940.

Particulars are given of a case of rhinosporidiosis of the conjunctiva, due to *Rhinosporidium seeberi* [*R.A.M.*, xix, p. 218] in a 17-year-old male patient at the Cooper Hospital, Camden, New Jersey. Histological sections revealed structures of dimensions ranging from 20 to 250 μ in diameter, the large ones representing sporangia containing numerous spores, of which 16,000 were counted in receptacles measuring 140 μ.

Peck (S. M.), Rosenfeld (H.), & Glick (A. W.). **Fungistatic power of blood serum.**—*Arch. Derm. Syph., Chicago*, xlii, 3, pp. 426–437, 3 figs., 1940.

A tabulated account is given of experiments at the Mount Sinai Hospital, New York, showing the fungistatic (as distinct from fungicidal) influence of human blood serum, in concentrations of 30 per cent. and upwards, on cultures of *Trichophyton gypseum* in Sabouraud's bouillon.

Araki (M.). **Studien über die Dermatomykosen und ihre Erreger in Korea. I. Mitteilung. Trichophytie in Soeul.** [Studies on the dermatomycoses and their agents in Korea. Note I. Trichophytosis in Soeul.]—*Jap. J. Derm. Urol.*, xlvii, 5, p. 120, 1940.

The relative prevalence of the fungi in 39 isolates from 113 cases of trichophytosis in the Soeul district of Korea was as follows: *Microsporon japonicum* [*R.A.M.*, xvii, p. 818] 11, *Sabouraudites ruber* [*Trichophyton rubrum*] 9, *S. interdigitalis* [*T. interdigitale*] 9, *S. asteroides* [*T. mentagrophytes*] 6, *Epidermophyton inguinale* [*E. floccosum*] 2, and *T. pedis* [ibid., xix, p. 654] and *Bodinia violacea* [*T. violaceum*] 1 each.

Takahashi (S.) & Yoh (T.). **Über die Trichophytie in Nord- und Mittel-Formosa.** [On tricophytosis in north and central Formosa.]—*Jap. J. Derm. Urol.*, xlvii, 5, p. 120, 1940.

From 1,349 cases of ringworm of the scalp in north and central

Formosa, *Grubyella japonica* [*Microsporon japonicum*] was isolated in 887, *Bodinia violacea* [*Trichophyton violaceum*] in 379, *B. glabra* [*T. glabrum*] in 33, *Sabouraudites coccinea* [*T. coccineum*: *R.A.M.*, xiii, p. 769] in 92, *S. radiolatus* [*T. radiolatum*: ibid., xviii, p. 456] in 1, while 2 yielded hitherto undescribed species. From 31 cases of trichophytia eczematosa marginata and trichophytia vesiculosa *S. purpureus* [*T. purpureum*] was isolated in 17, *T. radiolatum* in 7, *M. japonicum* in 4, and *Epidermophyton inguinale* [*E. floccosum*], a variety of *S. gypseus* [*T. gypseum*], and an *E.* sp. in 1 each. *S. interdigitalis* [*T. interdigitale*] was isolated from 15 out of 18 cases of trichophytia pompholyciformis, *T. radiolatum* from 2, and *T. pedis* from 1.

Epstein (S. S.) & Snell (F. D.). **Gentian violet in Sabouraud's medium for isolation of pathogenic fungi.**—*Arch. Derm. Syph., Chicago*, xlii, 2, pp. 308–311, 1940.

In comparative experiments at Brooklyn, ordinary Sabouraud's medium (4 per cent. dextrose, 1 per cent. peptone, and 2 per cent. agar) and the peptone-free dextrose medium of Legge *et al.*, with P_H values of 5·2 to 6 and containing 0·001, 0·0004, 0·0002, and 0·0001 per cent. gentian violet, were heavily inoculated with stock *Trichophyton* (*T. interdigitale* and *T. rosaceum*) cultures, with and without added profuse bacterial contamination, and also with primary impure growths of *T.* arising from human infections, and maintained at room temperature. Gentian violet was found markedly to inhibit the development of the usual bacterial flora of the skin without impeding that of the fungi, the best results being secured by the addition of 0·0002 per cent. (1 : 500,000) of the dye to plain Sabouraud's medium at P_H 5·8 prior to sterilization. Of 44 fungi isolated from 62 lesions in 131 cases of clinical dermatophytosis in an orphanage, 33 (75 per cent.) were obtained on the plain medium as compared with 42 (95·5 per cent.) on the same with added gentian violet. The fungi isolated were *T. interdigitale* (39), *T. rosaceum* (2), *E.* [*T.*] *rubrum* (2), and *Monilia* [*Candida*] *albicans* (1).

Danbolt (N.). **Deep cutaneous moniliasis, a fatal case of a peculiar type.**—*Acta derm.-venereol., Stockh.*, xxi, 1, pp. 98–117, 7 figs., 1940. [German and French summaries.]

The fungus isolated from infiltrations in the skin of a 78-year-old male patient at the Oslo State Hospital in 1938 was characterized on Sabouraud's medium by flat, white colonies, up to 8 mm. in diameter, the border of which consisted of oval blastospores, 5 to 7 by 3 to 5 μ, and the centre of round and oval yeast-like cells, some in process of forming hyphae, 2 to 3 μ in diameter. Blood agar gave rise to small, shiny, stellate colonies, with masses of blastospores in the points of the stars and hyphae in the medium only. The organism fermented glucose, levulose, and maltose, producing acid and gas, the former only being evolved from galactose, saccharose, and dextrin. Gelatine was not liquefied or milk coagulated. The fungus is tentatively identified as *Monilia* [*Candida*] *stellatoidea* [*R.A.M.*, xix, p. 596]. Inoculation experiments on laboratory animals gave negative results.

Humphrey (A. A.). **Reticuloendothelial cytomycosis (histoplasmosis of Darling).**—*Arch. intern. Med.*, lxv, 5, pp. 902–918, 3 figs., 1940.

This is a detailed account of the clinical, histological, and microscopic features of two fatal cases, one in a 17-year-old and the other in a 46-year-old male, both in Michigan, of Darling's histoplasmosis (*Histoplasma capsulatum*) [*R.A.M.*, xix, p. 654], for which the author proposes to substitute the more apt name of reticuloendothelial cytomycosis in accordance with De Monbreun's studies on the disease [ibid., xiv, p. 445]. In connexion with a discussion on the etiology of the disorder, it is mentioned that M. Moore, *in litt.*, expressed the opinion that, in addition to *H. capsulatum*, another closely related fungus is concerned in the production of the disease. There is evidence to suggest that the ear is a primary channel of infection.

Wittich (F. W.). **The nature of various mill dust allergens.**—*J. Lancet*, N.S., lx, 9, pp. 418–421, 1940.

The results of a four-year survey and study of the nature of the various mill dust allergens in Minnesota [*R.A.M.*, xvi, p. 38] are presented, together with clinical observations. Among the air-borne allergens observed in mill dust in 1938 were various cereal smuts and rusts, and species of *Helminthosporium*, *Fusarium*, *Penicillium*, *Alternaria*, *Hormodendrum*, *Acrothecium*, and *Syncephalastrum*. Of 135 patients tested for their reaction to some of the above-mentioned organisms [cf. next abstract], 82·9 per cent. were clinically sensitive to the common air moulds [ibid., xix, p. 594], 76·3 per cent. to the smuts, and 62·9 per cent. to grain mill dust. The mill dusts were found to induce anaphylaxis in guinea-pigs and there is an antigenic relationship between the grain dusts and their smut parasites. In the Grain Belt region the smuts have been found to act as definite excitants of hay fever and asthma and in some cases to be quite toxic.

Waldbott (G. L.) & Ascher (M. S.). **Rust and smut, major causes of respiratory allergy.**—*Ann. intern. Med.*, xiv, 2, pp. 215–224, 2 graphs, 1940.

Since July, 1938, the writers have charted the number of spores of rust (*Puccinia graminis*) and smuts (*Ustilago levis* [*U. kolleri*] on oats and *U. zeae* on maize) found on vaseline-coated slides exposed for 24-hour periods at Detroit, Michigan. The first uredospores of *P. graminis* developed about 15th July and reached a peak on 21st. Another rise in the spore count on 30th July was probably due mainly to the smuts. *Alternaria* was present throughout the period of the observations.

Scratch and intradermal skin tests were performed on 106 patients with filtered extracts of the above-mentioned fungi, *Hormodendrum*, and *Penicillium* [see preceding abstract], as a result of which three categories were established, viz., 7 persons developing clinical reactions during the rust and smut season, 12 suffering definite exacerbation of their symptoms at this period, and 87 giving no particular seasonal manifestations. Details are given concerning two patients in whom the intradermal skin test for *P. graminis* induced generalized reactions and asthmatic attacks were provoked by inhalation of rust powder.

On the basis of these data the authors regard sensitivity to rust and smuts as an important factor in seasonal allergy of the upper respiratory tract.

Robinson (B. B.). **Flax-fiber production.**—*Fmrs' Bull. U.S. Dep. Agric.* 1728, 28 pp., 13 figs., 1940.

Popular notes are given (pp. 13–16) on the following diseases affecting fibre flax in the United States: wilt (*Fusarium lini*), rust (*Melampsora lini*), pasmo or rust blotch (*Phlyctaena linicola*) [*Sphaerella linorum*: *R.A.M.*, xviii, p. 739], anthracnose (*Colletotrichum linicola*), and heat canker. The relatively mild form assumed by wilt of recent years in Michigan and Oregon is attributed to the use of new land or of areas from which flax has been excluded for some time.

Castillo (B. S.) & Celino (M. S.). **Wilt disease of Abacá, or Manila Hemp (Musa textilis Née).**—*Philipp. Agric.*, xxix, 1, pp. 65–85, 5 figs., 1940.

A full account is given of the writers' inoculation experiments to determine whether the agent of abacá (*Musa textilis*) wilt in the Philippines is identical with that of banana wilt (*Fusarium oxysporum* f. 3) [*F. oxysporum* var. *cubense*: *R.A.M.*, xix, p. 347]. The symptoms induced by infection with pure cultures of the fungus from Davao included inward curling of the leaf blades at or near the lower leaf tips, bunching of the foliage, slow growth of the plant, and violet discoloration of the vascular bundles; there was no cracking of the pseudo-stem similar to that caused by the same organism in Latundan bananas. Infection of both abacá seedlings and banana suckers was secured either by the application of pure cultures directly on the corms or by the admixture of the inoculum with sterilized soil. Fresh injuries on the roots and corms were not a necessary condition of infection in either host. In the case of four-month-old abacá seedlings, all the 58·3 per cent. infected plants succumbed to the disease, whereas at one year only 14·3 per cent. died though 35·7 per cent. developed wilt symptoms. An incubation period of one to four or two to six months elapsed between inoculation and the appearance of symptoms in abacá and banana, respectively. The severity of wilt in the experimental abacá plantings was aggravated by injuries inflicted by the corm weevil, *Cosmopolites sordidus*.

The outcome of these trials, supported by that of morphological and cultural studies, is considered to establish the identity of the abacá wilt fungus with *F. oxysporum* var. *cubense*, the spread of which should be prevented by the destruction of infected plants and those surrounding it within a radius of 10 m., the exclusive use of healthy material for planting, and other sanitary measures to restrict the movement of the parasite into areas not yet affected.

Kirby (R. S.). **Alternaria branch rot on Carnation cuttings.**—*Flor. Exch.*, xciv, 1, p. 11, 1940. [Abs. in *Biol. Abstr.*, xiv, 6, p. 1063, 1940.]

The best control of *Alternaria* [? *dianthi*] on Puritan carnation [*R.A.M.*, xix, p. 477] cuttings was secured by ten minutes' immersion in 1 in 1,000 potassium permanganate, followed by rinsing and the

dipping of the ends in naphthalene acetic dust, though treatment with either potassium permanganate or naphthalene acetic dust alone was also effective. The dual treatment reduced infection to 5 per cent. of the cuttings compared with 60 per cent. in the controls. Washing the sand to eliminate humus was beneficial only in the case of untreated cuttings.

Gregory (P. H.). **The control of Narcissus leaf diseases. I. White mould and fire on 'Golden Spur'.**—*Ann. appl. Biol.*, xxvii, 3, pp. 338–347, 1940.

A detailed description is given of spraying tests carried out in west Cornwall and the Scilly Isles from 1935 to 1939 on commercial stocks of the *Narcissus pseudo-narcissus* variety Golden Spur, a preliminary account of which has already been noticed [*R.A.M.*, xix, p. 97]. Three applications of Bordeaux mixture 4–4–40 or 4–3–40 prepared with hydrated lime, the first when the shoots are 4 to 6 in. high and the other two at monthly intervals, gave practically complete control of white mould, *Ramularia vallisumbrosae*, and satisfactory control of fire, *Sclerotinia polyblastis*. This treatment gave excellent results under conditions favourable to epidemic attacks, but in normal seasons a single application made shortly after flowering would probably suffice. Bordeaux mixture not only prevented primary infection of the leaf tips from sclerotia on the ground and arrested secondary spread, but also checked the development of sclerotia of the two fungi on the leaves, thus reducing the risk of the soil becoming contaminated. Cuprous oxide suspensions were fairly effective but inferior to Bordeaux mixture; sulphur fungicides proved to be of no practical value in controlling the two diseases. In the absence of disease, spraying of the variety Cheerfulness with Bordeaux mixture had no effect in increasing the crop.

Cormack (M. W.). **Phytophthora cactorum as a cause of root rot in Sweetclover.** —*Phytopathology*, xxx, 8, pp. 700–701, 1940.

The fungus responsible for a destructive root rot of sweet clover [*Melilotus*] occurring in Alberta was identified by S. F. Ashby as *Phytophthora cactorum*, to which F. R. Jones now also attributes a closely similar disease in the United States formerly ascribed to *P. megasperma* [*R.A.M.*, xix, p. 101], since found to be only weakly pathogenic, if at all, to the host in question. This is apparently the first record of *P. cactorum* on sweet clover. So far, the damage caused by the root rot in Alberta has been restricted to scattered field or roadside plants, but its potential importance may be gauged by the mortality of 20 per cent. observed in one locality in June, 1939. Inoculation experiments with several isolates of *P. cactorum* on sweet clover and lucerne roots resulted in a rapid wilt of the former but were negative on the latter. Mature plants appear to be more susceptible than seedlings, the average infection ratings of second-year plants in the flowering stage and two-month-old seedlings being 90 and 60 per cent., respectively.

Weimer (J. L.). **Root rot of Austrian Winter Peas and Vetches.**—Abs. in *Phytopathology*, xxx, 8, p. 708, 1940.

Austrian winter [field] peas (*Pisum* [*sativum* var.] *arvense*) and

vetches are liable to more or less extensive damage from a root rot associated with a yellow discoloration, dwarfing, and gradual death of the tops, a characteristic feature in vetches, especially Monantha [*Vicia monantha*=*V. calcarata*], being the development of a reddish colour. The early stage of decay may develop as early as December, but the plants do not usually die until the late winter or early spring. The disease is most severe during wet seasons. The oospores of a species of *Aphanomyces*, probably *A. euteiches* [*R.A.M.*, xviii, p. 777], are present in the affected roots, and this fungus is thought to be a major factor in the initiation of infection; other organisms commonly found in the diseased tissues included *Pythium graminicolum*, *P. irregulare*, *Rhizoctonia* sp., and *Fusarium* sp., of which the three first-named are capable of causing rots of varying extent under favouring conditions. Control measures should be based on an appropriate manuring scheme, good drainage, and protracted crop rotation. Hairy [*V. villosa*], Smooth, Light-Seeded Hungarian, and Hungarian [*V. pannonica*] vetches and *V. hybrida* are fairly resistant, Woolly Pod, *V. calcarata*, and Common [*V. sativa*] susceptible. No resistant variety of peas has been observed.

Kroulik (J. T.) & Gainey (P. L.). **Relative nodulation of varieties of Medicago sativa varying in susceptibility to Alfalfa wilt.**—*Soil Sci.*, l, 2, pp. 135–140, 1940.

No evidence was forthcoming in a series of tests at the Kansas Agricultural Experiment Station of any correlation between the resistance of Kansas Common (and a wilt-resistant selection of the same, Ladak) and Turkestan lucernes to infection with *Rhizobium meliloti* on the one hand and *Phytomonas insidiosa* [*Aplanobacter insidiosum*] on the other.

Muskett (A. E.) & Calvert (E. L.). **Blind seed disease of Rye-Grass.** —*Nature, Lond.*, cxlvi, 3693, pp. 200–201, 1 fig., 1940.

Observations in Northern Ireland confirm the view that *Pullularia* sp. and the fungus associated with blind seed disease of rye grass [*Lolium perenne* and *L. multiflorum*] may be present on one and the same seed [*R.A.M.*, xix, p. 542]. The *Pullularia* conidia are small and yeast-like, whereas those of the other organism are larger, allantoid, and more regular in size and shape. The former fungus is generally associated with the glumes and the exterior of the caryopsis, while the latter is found only in and on the caryopsis.

Heads of commercial perennial rye grass turves in full flower were inoculated with the following spore suspensions, viz., conidia of *Pullularia* sp. and the blind seed fungus from Northern Ireland, conidia of the latter from New Zealand, a suspension of ascospores from *Helotium*-like apothecia growing from dead rye grass seeds in the field where the turves were cut (these apothecia markedly resembling those described from New Zealand [ibid., xviii, p. 601], their detection apparently constituting a first record of their occurrence elsewhere), and sterile water. The results obtained showed that the seeds in the controls and those in the heads inoculated with *Pullularia* were all healthy. The heads inoculated with the Northern Ireland and New Zealand strains of the blind seed fungus and the ascospore suspension showed, respectively, 10·6, 5·4, and 7·6 per cent. diseased seeds.

It is concluded that the *Helotium*-like apothecium is the perfect stage of the blind seed fungus, cultures from single ascospores resembling those of the latter in every respect. The *Pullularia* is probably saprophytic, and the disease should be known by Neill's name 'blind seed disease', rather than '*Pullularia* disease'.

Brooks (C.). **Gas storage.**—*Canad. Chem. Process Industr.*, xxiv, 3, pp. 111–112, 1940.

In this abstract of a paper presented at the Eastern Air Conditioning Conference in November, 1939, the author comments on the rapid development of gas storage for apples in England, where over 200 plants are in operation. One of the chief reasons for this advance is considered probably to lie in the susceptibility of many English-grown apples to low-temperature breakdown, necessitating their storage at 38° to 40° F. instead of at the usual refrigeration temperature of 32°. These considerations do not generally apply in North America, where successful results are obtained by ordinary cold storage methods, but possibly growers of McIntosh or other varieties susceptible to soft scald or soggy breakdown might be well advised to construct private gas storage plants. The value of the treatment in the storage of other fruits is also discussed.

Moore (M. H.). **A brief review of research work at East Malling on the control of Apple scab.**—*Rep. E. Malling Res. Sta., 1939*, pp. 75–76, 1940.

In this brief review of fourteen years' research work at East Malling and elsewhere on spraying for the control of apple scab [*Venturia inaequalis*] the author states that so far lime-sulphur is still the standard fungicide for the purpose, as other sprays, while perhaps safer to use, have not equalled it in fungicidal efficiency, except when used at uneconomic concentrations. It is also the most valuable material against mildew [*Podosphaera leucotricha*]. The addition of ferrous sulphate (for added safety) was found to blacken the spray, and the use of cotton-seed oil with Bordeaux mixture proved expensive, and the mixture was not altogether safe on apples. In all diseases controllable by protective spraying the chief problem is spray injury. Evidence was obtained that the incidence of apple scab and of spray damage resulting from attempts to control it is closely related to environmental factors, including locality, weather, and soil. A study of these factors is essential to further progress, and experiments are already in progress to determine the influence of cover-cropping, soil moisture content, and manuring on the susceptibility of host plants to disease and spray injury.

Lugeon (A. R.). **Storage scab of Apples.**—*Gdnrs' Chron.*, cvii, 2791, p. 315, 1940.

Experiments at the Cantonal Station of Arboriculture, Marcelin-sur-Morges, Switzerland, are stated to have shown that the best control of storage scab of apples (*Venturia inaequalis*) [*R.A.M.*, xv, pp. 135, 588; xix, pp. 354, 547] is obtained by the application, during the latter part of August or early September, dependent on weather conditions, of a dilute 'solution' (0·15 per cent.) of a brand of copper carbonate with

a high copper content. The solution leaves no trace at picking time even on varieties sensitive to russeting by sprays.

WORMALD (H.). **The angular leaf spot of Apple trees.**—*Rep. E. Malling Res. Sta., 1939*, pp. 63–66, 4 figs., 1940.

The angular leaf spot of apple leaves, first observed in England in 1937, and attributed by Moore to *Phyllosticta angulata* [*R.A.M.*, xviii, p. 400], again appeared at Lingfield, Surrey, in 1938, when no fungal fructifications were observed on the lesions, and in 1939 was seen at Kirdford and Fittleworth (Sussex), Alton (Hampshire), Danbury (Essex), Paddock Wood (Kent), and, on a single leaf, at Brenchley (Kent). The most severe outbreak was at Kirdford, where, in a few cases, nearly all the leaves on a spur were rather severely affected, though the infected trees seldom showed more than a few diseased spurs. The varieties most seriously affected were Worcester Pearmain, Bramley's Seedling, King of the Pippins, and Blenheim Orange. The condition occurred on all the trees in one field (where the trees were in grass); in cultivated plantations it was much less common and less severe. Some of the spots showed the presence of a *Phyllosticta* which differed from that described by Wenzl [loc. cit.] in that the pycnidia were larger and had larger pores, and the spores had mostly two oil drops. In spore size and presence of oil drops the fungus agreed with that described and figured by Salmon in 1908 and included by Grove (1935) [ibid., xv, p. 53] under *P. mali*, but Salmon's fungus occurred on large, almost circular spots.

In parallel culture on the same medium the Kirdford fungus and *P. angulata* from Wenzl's material behaved differently in growth rate and general habit; the two fungi are not, therefore, identical, though they may be divergent forms within one species.

At present there is no evidence that the disease produces premature leaf fall or weakens the trees.

In an appendix to this paper it is stated that Massee and Steer in May, 1940, found a similar but dark brown or reddish-brown angular leaf spot of apple and pear at Tenterden, Kent, associated with severe infestation by the froghopper *Cercopis sanguinea* Geoff. and have established that the froghopper is the cause of the spots. In June, 1940, the authors received apple leaves also showing dark brown, angular spots from an orchard where angular leaf spot had been present in 1939, and were informed that froghopper infestation was abundant. Observations are being continued to ascertain whether the greyish-brown and dark brown spotting are phases of the same disorder.

NIEDERHAUSER (J. S.) & WHETZEL (H. H.). **Observations on the varietal susceptibility of Apples to Gymnosporangium juniperi-virginianae.**—*Phytopathology*, xxx, 8, pp. 691–693, 1940.

The apple varieties tested in 1939 at Ithaca, New York, for their reaction to *Gymnosporangium juniperi-virginianae* reacted as follows [cf. *R.A.M.*, xiii, p. 312; xix, p. 659]: Yellow Transparent, Wagener, Lady, McIntosh, Dutchess of Oldenburg, Rhode Island Greening, Chenango Strawberry, Baldwin, Northern Spy, Red Astrachan, Sutton (Beauty), Red Delicious, Hubbardston, and Pound Sweet (?) were

immune; Golden Delicious, Mother, and Roxbury Russett very resistant; Westfield Seek-No-Further resistant; Ensee and Tomkins King susceptible; and Twenty Ounce, Yellow Bellflower, Winter Banana, Wealthy, and Summer Rambo very susceptible.

Wellman (R. H.) & Heald (F. D.). **The toxicity of certain chemicals in aqueous solutions to spores of Penicillium expansum.**—*Phytopathology*, xxx, 8, pp. 638–648, 1 fig., 1940.

In an attempt to find a substitute for sodium hypochlorite, the use of which for the control of *Penicillium expansum* on apples in the Pacific North-West [*R.A.M.*, xvii, p. 505] is attended by various disadvantages, the writers tested a number of chemicals in aqueous solutions, strong claims for one of which (sodium ortho-phenylphenate) as a remedy for this type of decay [cf. ibid., xix, p. 289] have been advanced by commercial concerns. The spores used in the experiments were derived from 7- to 15-day-old colonies on 2 per cent. potato dextrose agar at 68° F., the resistance of which to *P. expansum* has been shown by K. F. Baker (in an unpublished thesis, Washington State College, 1934) to be greater than that of older material. All the exposures were made for a period of one minute.

A concentration of 4,000 p.p.m. of sodium ortho-phenylphenate was found to kill the spores at 68° in the absence of organic matter, while at 110° it is effective under the same conditions at 3,000 p.p.m. Exposure to air causing decomposition of this compound, the solubility of each lot should be tested before appraising its value. A mixture of sodium tetrachlorophenate and sodium 2-chloro-ortho-phenylphenate [ibid., xviii, p. 364] proved to be more toxic to *P. expansum* at 68° than either pure sodium tetrachlorophenate or sodium ortho-phenylphenate, destroying a high percentage of the spores at 2,500 p.p.m.

Of nine triphenylmethane dyes investigated, only crystal violet, gentian violet, and malachite green were toxic to the mould spores at 1,000 p.p.m., these limited data being considered to support Thornberry's evidence in favour of a relationship between the number of methyl groups attached to the amino-nitrogens and their fungicidal activity [ibid., xi, p. 525]. None of the twelve miscellaneous dyes tested showed any fungicidal activity at the maximum concentration of 1,000 p.p.m., while of various organic disinfectants included in the trials, only sodium salicylate and thymol completely inhibited colony formation by *P. expansum* at a strength of 10,000 p.p.m.

Of the 25 inorganic chemicals tested, chromium trioxide, potassium dichromate [ibid., xviii, p. 441], and sodium thiosulphate exerted a fungicidal action at 10,000 p.p.m., while iodine, mercuric chloride, and potassium mercuric iodide were effective at 1,000.

It is pointed out that these results are not to be interpreted in terms of blue mould decay control, but merely as indications of possible lines of approach to this problem.

Siegler (E. A.) & Bowman (J. J.). **Root responses of noninfectious hairy root Apple seedlings under different methods of propagation.**—*J. agric. Res.*, lx, 11, pp. 739–754, 5 figs., 1940.

The name 'non-infectious hairy root', as distinct from infectious

hairy root caused by bacteria [*Bacterium rhizogenes*: *R.A.M.*, xvi, p. 191], is proposed for the disorder of apple trees characterized by an excessive number of lateral roots on the main root in the region extending from the collar to a distance of several inches below the ground line. Up to the present no evidence has been found pointing to a pathogen being involved in this condition, although the possibility that a virus may be an etiological factor should not be disregarded. Experiments with apple seedlings from various seed sources, including French crab, conducted during the years 1936 to 1938, showed that progeny from commercial (domestic) varieties were particularly affected by the disorder. Field counts indicated that approximately 20 per cent. of the average run of domestic seedlings exhibited the symptoms. The only exception was the variety Delicious, which showed a comparatively small percentage of affected seedlings and is stated to make exceptionally good root graft unions. The inherent or genetic nature of the disorder was experimentally demonstrated and it was shown that the symptoms are influenced by the degree of stem rooting. It is concluded that the use of any portion of seedlings affected by non-infectious hairy root in propagation will result in manifestation of the symptoms unless the scion variety develops vigorous scion roots. Nurserymen commonly discard all trees showing symptoms of the disorder, and in order to avoid this loss no part of affected seedlings should be used for propagation purposes. It is suggested that selections from clones that exhibit pronounced symptoms may readily furnish sources for dwarfing rootstocks.

Reyneke (J.) & Stubbings (W. A. K.). **Oil sprays in relation to the development of scald in Bon Chrétien Pears.**—*Fmg S. Afr.*, xv, 173, pp. 313–314, 324, 1940.

During recent years scald [*R.A.M.*, xvii, p. 468] caused such serious damage to Bon Chrétien pears in South Africa that the commercial value of this variety has become questionable. Coincident with this increase has been the use of heavy spraying against codling moth [*Cydia pomonella*] and drastic methods of arsenic removal. In experiments during the 1938–9 season the juice of Bon Chrétien pears sprayed with 1 per cent. summer oil emulsion (12 applications at weekly intervals) showed a lower sugar content than those sprayed on the same dates with lead arsenate and a spreader, indicating that the oil-sprayed pears were greener at picking time owing to the delaying action of the oil on the development of the fruit. The oil-sprayed pears, however, developed practically no scald in storage, which is considered to be due to the protective action of the oil layer on the fruit. On the other hand, fruit sprayed with lead arsenate developed 21·4 per cent. severe scald or 46·8 per cent. total (including those with slight symptoms) in storage, the percentage of total scald rising to 59·9, 71·0, and 92·0 in fruit dipped before packing in 1 per cent. hydrochloric acid for two or three minutes or in 1 per cent. hydrochloric acid with ¼ per cent. areskap [ibid., xviii, p. 598] for three minutes, respectively. None of the dipping treatments induced severe scald in oil-sprayed fruits, but 29·0 per cent. total (chiefly slight) scald developed when areskap was included in the treatment. The adverse effect of areskap is attributed to its solvent action on the protective mineral oil layer and the natural

waxes of the fruit, which would increase the susceptibility of the fruit to acid injury and scald. Dipping in acid increased the amount of internal breakdown [loc. cit.] in arsenate-sprayed fruits, but not appreciably so in those treated with oil. It is concluded that the oil forms a protective layer against cold injury and consequent scald and against acid damage. Possibly it also modifies the course of metabolism of the fruit on the tree and in storage. With regard to a practical application of these results, the use of oil in every spray of the programme is considered undesirable, since a heavy oil layer is detrimental to the fruit and the tree. The combined use of lead arsenate and oil emulsions, either together or apart, in the same spray programme is advocated, provided oil sprays are not applied after the beginning of December, as this would complicate residue removal.

Smolík (L.). **Natural ferromanganiferous concretions as remedy for chlorosis.**—*Trans. int. Soc. Soil. Sci., 1939*, pp. 95–97, 1939. [Received June, 1940.]

Natural ferromanganiferous concretions from podsols and podsolized soils were ground into a very fine powder and applied in May, 1930, to the roots of six two-year-old chlorotic Du Lectier pear trees [*R.A.M.*, xviii, pp. 36, 702] growing in loamy soils containing about 8 per cent. calcium carbonate at the Pomological College, southern Moravia, a total of 3 kg. being used for the six trees. By May, 1932, the trees treated by this method presented a fully normal appearance, whereas the controls and trees given copper or ferrous sulphate were completely defoliated. Other trees affected by chlorosis in the same district were apple [loc. cit.], plum [ibid., xvii, p. 687], weeping willow [*Salix babylonica*], *Acacia*, and maple [*Acer*].

Poole (R. F.). **The relation of nitrogen fertilization of the Peach to the control of Bacterium pruni.**—Abs. in *Phytopathology*, xxx, 8, p. 706, 1940.

Experiments were conducted to determine the effect of nitrogen on bacterial leaf spot of peaches (*Bacterium pruni*) in light sandy soils (to which the disease is practically restricted), 1 lb. nitrate being applied fortnightly to 12-year-old Elberta trees until a total of 6 lb. was reached. The treated trees contracted only mild infection and retained their dark green foliage until the onset of the frosts, whereas the leaves of the controls turned yellow, purplish, and red, and showed severe symptoms, including extensive defoliation. Chemical analyses of the leaves from both lots of trees revealed much higher concentrations of manganese, iron, calcium, potash, and magnesium in the treated than in the controls.

Mezzetti (A.). **Tumori sul colletto dei Mandorli.** [Tumours on the root-collar of Almonds.]—*Agric. lib.*, viii, 7, pp. 317–318, 1939.

Attention is drawn to the prevalence of crown gall (*Bacterium tumefaciens*) on the root collars of young almond trees in Libya. A degree of control may be effected by the excision of the tumours with a knife that has been flamed and disinfected in 10 per cent. copper or iron sulphate, treating the wounds with Bordeaux mixture, and leaving the

affected parts uncovered for the entire summer. The roots of apparently healthy trees which have been exposed to contact with diseased ones should be immersed for a couple of minutes in 1 per cent. Bordeaux mixture.

Luttrell (E. S.). **An undescribed fungus on Japanese Cherry.**—*Mycologia*, xxxii, 4, pp. 530–536, 9 figs., 1940.

For some years past *Prunus serrulata* trees grown as ornamentals at Duke University, North Carolina, have been infected by a fungus producing minute, black pustules towards the end of July on the surface of the young twigs. These pustules give rise to pseudoparenchymatous stromata and develop into acervuli, erumpent from the epidermal cells, and bearing erect, simple conidiophores, 40 by 4·5 μ over the upper surface. As the season advances, the acervuli become more prominent and the ruptured walls and cuticle are pushed back centrifugally to form a collar round the base of the acervulus, which is bordered by a layer of protective hyphae. The first stages of conidial formation occur in late March. Each cell of the conidiophore produces a sterigma at whose tip conidia are abstricted. As the distal cells of the conidiophore become exhausted they disintegrate and the protecting hyphae bend inwards. The conidia are unseptate, elliptic, at first hyaline, later light brown, 7 to 13 by 3 to 4·5 μ in diameter. After the conidia have been shed, the stroma and the basal portions of the protective hyphae remain as a shallow crater-like receptacle. In culture, the fungus formed masses of individual spherical to oblong or elliptical cells ranging from 7 to 25 μ in diameter, any one of them capable of producing one or more germ-tubes.

The fungus, while clearly being a member of the Melanconiaceae, is considered to be a new genus because of (1) the method of conidial formation and (2) the protective hyphae arising along the periphery of the stroma. This genus is named *Catenophora* n.gen., and the fungus itself *C. pruni* n.sp., Latin diagnoses being given both of the genus and of the species.

Harris (R. V.), Beakbane (A. B.), & Moore (M. H.). **A review of research on cane spot of Loganberry and Phenomenal Berry.**—*Rep. E. Malling Res. Sta., 1939*, pp. 68–69, 1940.

In further experiments in 1939 at East Malling on the joint control of the loganberry beetle (*Byturus tomentosus*) and the cane spot fungus (*Elsinoe veneta*) [*R.A.M.*, xviii, p. 325] on loganberries and phenomenal berries [a distinct pomological variety of *Rubus loganobaccus*] two spraying schedules were compared, viz., (*a*) pre-blossom and beetle stage and (*b*) the same, plus a post-cropping application, using a proprietary brand of colloidal copper fungicide combined with derris at the beetle stage, and Bordeaux mixture at the others. The data obtained showed schedule (*b*) to be the more effective. Another test was laid down, in 1938, in which two methods of training the plants were combined with the following spray applications, viz., (*a*) no spray, (*b*) post-cropping spray, (*c*) pre-blossom spray in May, and (*d*) pre-blossom and beetle stage sprays. The same spray materials were used as in the other experiment, and the records made in 1939 showed marked reduction in the

disease in those plants receiving spray treatments (*b*) and (*d*), particularly the former. A differential effect of the training methods was also noted.

WORMALD (H.) & HARRIS (R. V.). **Plant pathology, mycology, and bacteriology.**—*Rep. E. Malling Res. Sta., 1939*, pp. 28–30, 1940.

Apart from information already noted from other sources the following items may be mentioned in this report of research work carried out at East Malling. Strains of *Bacterium tumefaciens* [*R.A.M.*, xvii, p. 659] from various hosts, including raspberry, blackberry, and loganberry were found to differ in their ability to infect certain hosts. Promising results in control were obtained with an organic mercurial preparation [unspecified].

Experiments in the commercial control of raspberry mosaic [ibid., xix, p. 293] since 1927 indicated that maintaining supplies of clean cane from inspected and rogued nursery beds is not completely effective for varieties with a low symptom expression. The rapid testing of named and seedling varieties by direct infection and the use of indicator varieties is being attempted.

A comparison of the reactions of *Fragaria* spp. and commercial strawberry varieties to yellow edge [see next abstract] showed wide differences in susceptibility and symptom expression, ranging from high resistance and complete absence of symptoms in the parent species *F. chiloensis* to extreme susceptibility and continuous symptom expression in the other parent *F. virginiana* and the woodland strawberry *F. vesca*. These results show that the determination of the reaction of each named and seedling variety to the disease has become urgently necessary. By using *F. vesca* as an indicator, the clonal stock of Royal Sovereign strawberries raised at East Malling and rogued for yellow edge was confirmed to be free from this disease, but totally infected with mild crinkle [loc. cit.]. In 1938, samples of Royal Sovereign were obtained from a local stock in western Eire, where they had been introduced in 1905, and cultivated in almost unbroken isolation from other varieties. When grafted on to *F. vesca* most of these samples were completely free from yellow edge and crinkle, and in 1939 a pomological trial was begun to compare the performance of the mild crinkle-infected clones of Royal Sovereign with clones raised from the Irish strain.

HARRIS (R. V.) & KING (M. E.). **Review of research on Strawberry virus diseases, 1932–1939.**—*Rep. E. Malling Res. Sta., 1939*, pp. 66–68, 1940.

In this review it is stated that observations having shown that the symptoms of yellow edge [*R.A.M.*, xviii, p. 464; xix, p. 661] tend to be masked on the Royal Sovereign strawberry variety, a field experiment was started at East Malling in 1935 in which clonal series of plants were simultaneously infected by stolon-grafting each plant to an 'infector' from a clonal series of affected plants of the same variety. The symptom-intensity on a standard numerical scale was then recorded for individual plants of each series at weekly or fortnightly intervals up to 1939, fluctuations in symptom expression being examined in relation to environmental factors. Some time after the beginning of the experi-

ment, a Rogers' soil tensiometer was installed, and in 1939 striking correlations were noted between symptom-fluctuation and soil moisture. From such correlations it is now possible to predict the optimum time in a given season for the roguing of Royal Sovereign runner-beds.

Comparative transmissions by *Capitophorus fragariae* and grafting from strawberry plants with mild and severe crinkle [ibid., xviii, p. 326], respectively, to crinkle-free Royal Sovereign and *Fragaria vesca* plants gave results varying with the mode and source of infection, and demonstrated conclusively the etiologically distinct but closely related nature of the diseases. When transmission was effected by grafting, severe-crinkle plants always induced severe-crinkle symptoms, while mild-crinkle induced mild-crinkle; with aphid transmission, on the other hand, severe crinkle sometimes developed from mild sources, and vice-versa.

Report on the Department of Agriculture, St. Lucia, 1939.—38 pp., 1940.

In this report it is stated (on p. 26) that, during 1939, 556,538 banana stools were inspected in St. Lucia, of which 17,826 or 3·2 per cent. were found to be infected with Panama disease (*Fusarium* [*oxysporum*] *cubense*) [*R.A.M.*, xviii, p. 604]. In 1938 the corresponding figure was 2·86 per cent.

Condit (I. J.). **A bibliography on the Avocado (Persea americana Miller).**—293 pp., Riverside, Calif., Univ. Calif. Citrus Exp. Sta., 1940. [Mimeographed.]

The section relating to avocado diseases (pp. 115–131) in this bibliography contains 232 titles, covering the period from 1904 to 1939, inclusive.

Discussion on 'Efficiency with economy in the control of plant diseases and pests'.—*Ann. appl. Biol.*, xxvii, 3, pp. 433–440, 1940.

In opening this discussion at a meeting of the Association of Applied Biologists held in March, 1940, in London, H. Martin dwelt on the measures of controlling plant diseases under war conditions, concluding that chemical methods will be more extensively used than before. M. H. Moore contributed a paper on protective spraying against apple scab [*Venturia inaequalis*] dealing in particular with the correct timing of spray applications, the strengths of the sprays used, the methods of application, and the importance of adequate and balanced nutrition. C. Davis gave useful advice for the care of spraying machines and their accessories, and A. J. Wooldridge outlined an economical fruit spraying programme, successfully applied at his own farm for the last three years.

Montgomery (H. B. S.), Moore (M. H.), Shaw (H.), & Steer (W.). **Insecticides and fungicides.**—*Rep. E. Malling Res. Sta., 1939*, pp. 32–34, 1940.

Most of the information given in this review of the results obtained by the authors in their researches at East Malling during 1939 has already been noticed from other sources [*R.A.M.*, xviii, pp. 325, 461], but the following item may be mentioned. Experiments with the plum bacterial canker organism (*Pseudomonas mors-prunorum*) showed that it does not

survive outside the range P_H 2·8 to 9·6. Of 18 metals tested as nitrates mercury, silver, chromium, and copper were the most toxic, in the order given. Bordeaux mixture was no more toxic than a suspension of calcium hydroxide of similar alkalinity.

FINDLAY (W. P. K.). **Mould discoloration.**—*J. Oil Col. Chem. Ass.*, xxiii, 242, pp. 217–229, 1940.

Mould growths (chiefly species of *Aspergillus*, *Penicillium*, *Cladosporium*, and *Phoma pigmentivora*) on paint, though less troublesome in Great Britain, except under conditions of abnormally high atmospheric humidity, e.g., in breweries, laundries, and greenhouses, than in the Gulf States of America and the Panama Region [*R.A.M.*, xix, p. 613], are stated to be more serious on white than on coloured paints, not only because they are more obvious, but also for the reason that many coloured paints themselves contain fungicidal materials, or may be treated with the latter without impairment of appearance. Lead paints offer very little resistance to mould infection, but soluble zinc salts are highly fungicidal and zinc oxide moderately so. Lithopone is even more conducive to mould growth than white lead, and the same applies to titanium white, while antimony oxide is little or no better. Carbon black, blanc fixe, and other pigments with absorbed salts of potash or phosphorus are also reported to promote infection, which is greatly reduced, on the other hand, by the admixture of 2 per cent. zinc chrome with white lead paint. The tendency to mould development is further increased by linseed oil and the presence in the paint of 'foots' or traces of nitrogenous matter. In respect of resistance to fungal contamination, 'stored oils' are superior to raw or boiled, but in limited tests tung oil was found to be little or no better than linseed, while soy-bean was likewise ineffectual as a preservative. The more rapidly a paint dries the less likelihood there is of its becoming infected, since it is during the drying period that spores are liable to infect it. Enamels which dry with a smooth finish are less liable to infection than paints yielding a rough surface, offering easy lodgement for spores. The addition of hard resins increases resistance to infection. Nitrocellulose lacquers are by no means immune from attack, while bitumen and silicate compositions and aluminium paint are resistant.

No diffusion of nutriment from the substratum is necessary for fungal growth to occur on the paint film, but when the substratum is moist growth may be stimulated. The liability of underlying plaster to mould may affect the liability to mildew of any paint applied to it.

In warm, moist conditions the incorporation of some antiseptic in the paint is necessary to ensure a clean surface. The toxic constituent of most paints of this type for use in greenhouses and similar situations is a mercury salt, but such paints cannot be recommended for use in food factories and breweries, where trouble is often experienced.

In experiments on disks of mechanical wood pulp soaked in 2 per cent. malt solution, inoculated with *P. pigmentivora* and *Penicillium* sp., and incubated at 22° C., sodium pentachlorophenate (sold commercially as santobrite [ibid., xviii, p. 774; xix, p. 574]) gave almost perfect protection at the rate of 1 part per 100 of paint, while very satisfactory results were also obtained with mercuric chloride (1 in 500) and calomel

[mercurous chloride] (1 in 100, probably effective also at 1 in 500). A high degree of resistance was conferred by 5 per cent. zinc fluoride, zinc silicofluoride, zinc borate, and zinc benzoate. In limited tests under practical conditions on damp, mouldy door panels, paint containing 1 per cent. sodium pentachlorophenate and 5 per cent. sodium silicofluoride remained clean, whilst standard white lead paint showed considerable fungal growth.

The permanence of protection afforded the paint by the addition of antiseptics is an important consideration. In the United States the antiseptic in a concentrated form, mulled in oil, is marketed in a condition easy to mix with the paint; one firm of manufacturers has prepared mercurial and non-poisonous products for use out-of-doors and in domestic buildings or food factories, respectively.

Laboratory tests are only used to a limited degree to eliminate unpromising substances and it is necessary to carry out tests in selected localities. The author hopes to arrange for the exposure of test panels in the tropics, where climatic conditions are more suitable for tests than in England.

In treating painted surfaces against mould the discoloured paint should be either stripped or thoroughly washed with an alkaline cleaning soap solution containing trisodium phosphate or sodium metaphosphate at the rate of 1 lb. per gal. After drying, the infected areas should be brushed over with an antiseptic solution, e.g., mercuric chloride (1 in 500) or the non-poisonous thymol (1 in 200). A highly pigmented paint containing hard-drying pigments, especially zinc oxide, should be used where mould has been experienced. The use of less oil and more turpentine is recommended for paste paints.

Partansky (A. M.) & McPherson (R. R.). **Testing mold-resistant properties of oil paints.**—*Industr. Engng Chem.*, Analyt. Ed., xii, 8, pp. 443–445, 4 figs., 1940.

Particulars are given of a rapid, dependable, and convenient method of testing the mould-resistant properties of oil paints now in use at the Biochemical Research Laboratory, Dow Chemical Co., Midland, Michigan. Disks of western white pine [*Pinus monticola*], 3 in. in diameter and 0·25 in. thick, are extracted prior to the application of the paint with a high-solvency naphtha. After the lapse of at least five days since the application of the second coat of paint, the disks are soaked overnight in distilled water, seeded with the test fungus, a rapidly growing *Aspergillus*, and incubated in moist Petri dishes, generally for three weeks. For recording mould growth a binomial system with 10 as the maximum value for each reading is used, the first number of the pair indicating extent and the second intensity of growth.

Ludwig (W.). **Schimmelpilz-Bildung auf Anstrichen.** [Mould growth on painted surfaces.]—*Farbe u. Lack, 1939*, 42, p. 469; 43, p. 475; 44, p. 481, 1939.

Recommendations are made for the protection of painted surfaces from attack by moulds [see preceding abstracts], among which *Aspergillus niger* and *Penicillium glaucum* are stated to predominate in Germany: these include the application of aqueous alkaline vehicles, such

as lime or sodium silicate; the addition of 20 to 30 per cent. of a low-η stand oil to linseed oil paints to reduce their water absorption; the incorporation of a hard oil-reactive phenolic or alkyd resin; the use of chlorinated rubber, benzylcellulose, and bitumen in oil-free compositions; the admixture of zinc oxide with oil paints to harden the film; and (where fungal damage is particularly to be feared) the inclusion of a fungicide, e.g., among inorganic compounds 1 to 3 per cent. copper oxide or copper sulphate, 0·1 to 0·5 per cent. mercuric chloride, and of organic disinfectants, thymol, chlorisothymol, chlorometacresol, chloronaphthalene, phenol, and phenyl mercury acetate.

Chilton (S. J. P.). **A simple single-spore isolator.**—*Phytopathology*, xxx, 8, pp. 695–697, 1 fig., 1 diag., 1940.

An attachment [which is described] has been devised for clamping on to the holder of the substage condenser to make monospore isolations [*R.A.M.*, xii, p. 579; xviii, p. 334]. Satisfactory isolations have been effected with single spores only 7 μ in length.

Marchionatto (J. B.). **Las malezas y las enfermedades de las plantas cultivadas.** [Weeds and diseases of cultivated plants.]—*Agronomía, B. Aires*, xxxii, 157, pp. 26–36, 1940.

In view of the recognized importance of weeds as alternate hosts of diseases of economic crops [*R.A.M.*, ii, p. 563; ix, p. 390], a list is given of the fungi attacking some widely distributed representatives of this group of plants in the Argentine.

Bond (T. E. T.). **Observations on the disease of Sea Lyme-Grass (Elymus arenarius L.) caused by Ustilago hypodytes (Schlecht.) Fries.** —*Ann. appl. Biol.*, xxvii, 3, pp. 330–337, 2 pl., 1 fig., 2 diags., 1940.

Plants of *Elymus arenarius*, widely used for the prevention of coastal erosion, were observed in the neighbourhood of Aberdeen suffering from the disease caused by *Ustilago hypodytes* [*R.A.M.*, xv, p. 511]. The diseased shoots vary in their size, being in some cases smaller and in others taller than healthy ones. The diseased flowering stems remain sterile, producing leafy shoots in place of inflorescences. The vegetative region of the stem bears normal leaves and a normal number of internodes, but measures only one half the length of corresponding region of a healthy stem. The inflorescence region bears appendages resembling leaf sheaths without blades and has fewer internodes than the normal ear, but is much elongated. The fungus chiefly sporulates in the inflorescence. Occasionally, diseased stems may produce normal spikelets capable of forming grain. Near Aberdeen the fungus was also found on *Agropyron acutum*. An examination of excavated infected plants showed that the presence of the fungus favours vegetative elongation of the rhizomes at a time when this activity would otherwise be reduced. Mycelium was present in every node and associated resting bud of the rhizome as well as in the apices of all shoots and runners. In the mature stem it occurs chiefly in the outer cortical region but is also present in the parenchymatous tissue of the nodes and at the base of the leaf sheaths. In nature the disease is commonly spread by the vegetative multiplication of affected plants. A certain amount of

indirect evidence also points to the possibility of seedling infection by spores. All attempts to germinate the spores of the fungus in the laboratory failed and the results of inoculation experiments were inconclusive.

SADASIVAN (T. S.). **A quantitative study of the interaction of viruses in plants.**—*Ann. appl. Biol.*, xxvii, 3, pp. 359–367, 1 pl., 1 graph, 1940.

In protective inoculation experiments conducted at Rothamsted, two pairs of related viruses were used. Tobacco and *Nicotiana glutinosa* plants inoculated with tobacco mosaic virus or potato virus X^G (which cause systemic mottling symptoms in these plants) acquired immunity from tomato aucuba mosaic or potato virus X^S (which cause necrotic local lesions in the test plants). When the tips of tobacco leaves were inoculated with either tobacco mosaic or X^G virus and reinoculated with tomato aucuba mosaic or potato virus X^S after an increasing interval, the results showed that the X^G inoculated areas were quite immune from X^S after 12 days and the tobacco mosaic virus areas immune from aucuba mosaic virus after 4 days. The bases of such leaves showed incomplete inhibition even after 20 and 24 days. When the bases of the leaves were inoculated the results were essentially the same but the leaf tips acquired resistance much more slowly and incompletely.

When X^S or aucuba mosaic viruses were mixed *in vitro* with healthy plant sap or sap containing an unrelated virus, the infectivity of these viruses was reduced, but this inhibitory effect was much greater when they were mixed with their related strains.

It is concluded that in the plant tissue there is an intense competition between related viruses, and evidence was obtained that the degree of resistance to one is directly proportional to the amount of the other present.

ROBERTS (F. M.). **Studies on the feeding methods and penetration rates of Myzus persicae Sulz., Myzus circumflexus Buckt., and Macrosiphum gei Koch.**—*Ann. appl. Biol.*, xxvii, 3, pp. 348–358, 2 pl., 1940.

In further experiments on the methods of transmission of three strains of *Hyoscyamus* virus III, potato virus Y, and cucumber virus 1 by the aphids *Myzus persicae*, *M. circumflexus*, and *Macrosiphum gei* [*R.A.M.*, xix, p. 230], previously starved and non-starved insects were fixed on White Burley tobacco or Kleinwanzleben E sugar beet plants after feeding periods ranging from 5 minutes to 24 hours. The average depth of tobacco plant tissue penetrated by both starved and non-starved *Myzus persicae* after five minutes was 49 μ and that by *M. circumflexus* 57 μ, none of the aphids having reached the phloem. After one hour's feeding, 5 out of 9 *M. persicae* and all the six *M. circumflexus* examined were feeding in the phloem, and after 24 hours' feeding 6 out of 10 of the latter. Compared with these two species, *Macrosiphum gei* on tobacco showed a higher percentage of insects feeding in the phloem tissue. The mode of penetration was chiefly intracellular with *Myzus persicae* (59 per cent.) and consistently so with *Macrosiphum gei* (100 per cent.), but it was mostly intercellular with *Myzus circumflexus* (64

per cent. intercellular, 13 per cent. intracellular, and 23 per cent. doubtful).

In experiments with sugar beet, only 2 out of 18 *M. persicae* succeeded in penetrating the phloem after 15 minutes' feeding, and only 50 per cent. after two hours. The feeding habit of this aphid on sugar beet was very similar to that on tobacco, well over 50 per cent. of the penetrations being intracellular. In no case during these studies has a toxic reaction of the host plant to an insect's saliva been observed.

It is concluded from the results of these experiments that the efficiency of the vectors tested does not depend on localization of the viruses in the vascular tissue of the host plant and, in general, does not appear to be associated with any particular tissue tapped during feeding or with any special method of penetration. The only possible exception might be cucumber virus 1, in which case localization of the virus may account for the difference in behaviour between *M. persicae* and *M. circumflexus* in transmitting it, the latter aphid showing typical decrease in infectivity between 5 and 15 minutes' feeding, while the former shows no such decrease and sometimes does not reach maximum efficiency until 15 minutes. This difference may be explained by the fact that at the time of optimum infectivity for *M. persicae* (less than 5 minutes) the insect has not reached the tissues where the virus is most highly concentrated, whereas it seems that *M. circumflexus* penetrates more deeply than *M. persicae* during five minutes' feeding.

In experiments on the transmission of sugar beet yellows virus by *M. persicae*, the efficiency of the vector increased with increasing feeding time on both infected and healthy plants. The number of aphids penetrating to the phloem also increased with increasing feeding time, i.e., the percentage after 15 minutes, 2 hours, and 24 hours being 11, 50, and 77, respectively. Evidence was obtained suggesting that the beet yellows virus must be obtained from and inoculated into the phloem.

Steinberg (R. A.) & Thom (C.). **Mutations and reversions in reproductivity of Aspergilli with nitrite, colchicine and *d*-lysine.**—*Proc. nat. Acad. Sci., Wash.*, xxvi, 6, pp. 363–366, 1940.

The reason for previous failures to induce fungal mutation by means of colchicin is believed to lie in the use of acid solutions, which hydrolyse the effective principle into the virtually inactive colchicein. The destruction of the alkaloid may be prevented, however, by the addition of excess calcium carbonate to the solution, mutants approximating in type to those secured with nitrite [*R.A.M.*, xix, p. 424], but yielding more intermediate forms, having been easily obtained in recent experiments with *Aspergillus fumigatus*, *A. nidulans*, *A. flavus*, *A. fischeri*, *A. variecolor*, and *A. alliaceus*. Partial reversion of mutation in *A. amstelodami* has also been effected with the aid of colchicin.

The changes in inheritance experimentally induced in the eight species of *Aspergillus* investigated by the authors [loc. cit.] are departures from the normal inheritance of these species, the stability of which in some cases has persisted for more than 20 years. These artificially induced strains could be duplicated from forms obtained from natural sources. When produced at all by the mutants, conidia and ascospores conform entirely to those of the original strains. The action of nitrite results in

the production of mutants injured to a varying degree in their ability to differentiate and therefore to reproduce. Other reagents destructive of the amino group in amino acids and proteins exercise a similar effect. The use of high concentrations of *d*-lysine, the amino acid presumably affected by nitrite, resulted in reversion of mutation in *A. niger*, and to some extent in *A. amstelodami*. Chemical conditions conducive to the re-introduction of amino groups also bring about a reverse mutation, but the precise nature of the underlying process is by no means clear.

White (E. C.). **Bactericidal filtrates from a mold culture.**—*Science*, N.S., xcii, 2380, p. 127, 1940.

At the Brady Institute, Johns Hopkins Hospital, a mould tentatively identified by C. Thom as *Aspergillus flavus* has been found to grow readily in liquid media, yielding filtrates with a definitely bactericidal action on certain Gram-positive and Gram-negative organisms. Another strain of *A. flavus* was found to be totally inactive in this respect, whereas several members of the *oryzae-flavus* group and a strain of *A. parasiticus* were more or less toxic to the bacteria tested. The results with any mould are essentially dependent on the medium used.

Leonian (L. S.) & Lilly (V. G.). **Auxithals synthesized by some filamentous fungi.**—*Plant Physiol.*, xv, 3, pp. 515–525, 1940.

Of the six fungi tested at the West Virginia University for their capacity to synthesize biotin, thiamin, and the two moieties (pyrimidin and thiazole) of thiamin [cf. *R.A.M.*, xix, p. 649], *Fusarium niveum* was found to be able to synthesize biotin and thiamin from pure dextrose, amino acids, and inorganic salts, while *Phytophthora erythroseptica* can synthesize biotin but requires a supply of thiamin from an external source. The bulk of thiamin is stored in the mycelium, and only traces of this substance find their way into the medium; appreciable amounts of pyrimidin and thiazole, however, diffuse into the substratum. Biotin also resides largely in the mycelium, but it passes into the medium in larger quantities than thiamin.

Scottish Society for Research in Plant Breeding. Report by the Director of Research to the Annual General Meeting, 18th July, 1940.—32 pp., 1940.

The following items of interest occur in this report [cf. *R.A.M.*, xviii, p. 408]. W. Black states that in breeding potatoes for resistance to *Phytophthora infestans* [ibid., xix, p. 300] the proportion of resistant plants in the different seedling progenies, mostly derived from the highly resistant *Solanum demissum* back-crossed to a cultivated variety, ranged from $33\frac{1}{3}$ to more than 80 per cent. The mode of inheritance of resistance seems to be complex, but no difficulty was encountered in retaining resistance in combination with other desirable qualities. Progenies resulting from crosses between the resistant seedling 967c (38), a sixth-generation derivative of *S. demissum* and *S. edinense*, and cultivated varieties contained about 45 per cent. resistant types. In inter-crossing commercial types attention was given to those immune in the field from potato viruses A and X.

The new variety, Craig's Defiance, was multiplied at Ainville in 1939,

and a stock seed certificate was granted by the Department of Agriculture in respect of the crop.

In the section dealing with virus disease research (by G. Cockerham and C. H. Cadman) it is stated that the evidence obtained strongly suggested that necrotic reactions to viruses A, B, and C are determined by different 'necrotic' genes, all dominant over their 'non-necrotic' allelomorphs. There also appeared to be linkage relationships between some of the 'necrotic' genes. Viruses B and C were ascertained to be common causes of mosaic in certain varieties in the field.

In field trials the incidence of infection by the Y and leaf roll viruses in 1938 was higher than on any previous occasion, and this was associated with the earlier appearance of aphids than in previous years and the exceptionally high populations present in July and August [both virus Y and leaf roll being transmissible by aphids].

Black (L. M.). **Strains of Potato yellow-dwarf virus.**—*Amer. J. Bot.*, xxvii, 6, pp. 386–392, 4 figs., 1940.

In this paper the author describes further studies on the virus of potato yellow dwarf (*Marmor vastans* H.) [*R.A.M.*, xviii, p. 270; xix, p. 39]. Of the seven strains used, B_1 and B_2 were obtained from a *Nicotiana glutinosa* plant inoculated by means of *Aceratagallia sanguinolenta*, B_3 and B_7 by passing the field strain through Turkish tobacco and Large Rooted chicory, respectively, B_4 and B_5 from local lesions on *N. rustica* leaves inoculated with the field strain, and B_6 from a single individual of *A. sanguinolenta* which transmitted a necrotic type variant of the virus to *Trifolium incarnatum*. B_4 was similar to, if not identical with, the field strain.

On *N. rustica* the symptoms set up were as follows. B_1 produced light green, diffuse local lesions, the systemically invaded leaves slowly turning yellow. B_2 gave similar, but milder, symptoms. B_3 caused small, yellowish lesions with a definite outline, the systemically invaded leaves turning yellow at the tip and showing vein-clearing and yellow or brownish spotting over the remainder of the surface. B_4 gave rise to large, diffuse, yellow lesions, the systemically invaded leaves yellowing uniformly. B_5 produced brown lesions with necrotic, grey centres, and caused rapid leaf-yellowing, extensive vein necrosis, large, necrotic areas, and the death of the whole leaf, the plant itself sometimes succumbing. B_6, which was eventually lost, produced brown, necrotic lesions much smaller than those due to B_5. Systemic symptoms set up by B_6 were delayed, and extensive vein necrosis rapidly developed, apparently preceded by vein enlargement, the dead veins forming a raised reticulation; this was followed by large, necrotic blotches and the death of the entire leaf. When systemically invaded before maturity, the plant died. B_7 formed small, light yellow lesions with irregular margins; systemic symptoms were delayed, and took the form of intense leaf yellowing. On Green Mountain potatoes all the strains caused a rather severe disease, though some set up milder symptoms than others.

Cross-inoculation studies demonstrated that *N. rustica* plants previously invaded with B_1, B_2, B_3, or B_4 were protected against systemic invasion by B_5, and could not be distinguished in this respect from the

controls. When B_5 was inoculated into *N. rustica* plants previously invaded by potato ring spot (*M. dubium* H. var. *annulus* H.), potato veinbanding (*M. cucumeris* H. var. *upsilon*), cucumber mosaic (*M. cucumeris* H. var. *vulgare* H.), lucerne mosaic (*M. medicaginis* H. var. *typicum* Black & Price), B_2, or B_7, advanced systemic symptoms of B_5 developed on all the plants except those previously invaded by B_2 and B_7.

Of the seven strains described, only B_4 and B_5 appear at present (by reason of their usefulness and probable permanence) to merit varietal names, and are, accordingly, named *M. vastans* H. var. *vulgare* n. var., and *M. vastans* H. var. *lethale* n. var., respectively.

Güssow (H. T.) & Racicot (H. N.). **Bacterial ring rot. A serious menace to the Potato industry.**—1 p., 1 col. pl., Ottawa, Sci. Serv., Agric. Suppl. Bd, Dom. Dep. Agric., 1940.

This poster giving directions for the prompt recognition in the field in Canada of bacterial ring rot of potatoes (*Bacterium sepedonicum*) [*R.A.M.*, xix, p. 428] is noteworthy for the attractive coloured plate illustrating the early and late symptoms of the disease.

Metzger (C. H.) & Binkley (A. M.). **Some evidence on the spread of bacterial wilt.**—*Amer. Potato J.*, xvii, 8, pp. 198–201, 1940.

Evidence is presented in tabular form showing that at the Colorado State College a larger number of potato plants down the row (i.e., the direction in which irrigation water travels) from a plant showing symptoms of bacterial wilt [*Bacterium sepedonicum*: *R.A.M.*, xix, p. 360] contracted infection than those up the row. A total of 200 out of a possible 480 plants (41·7 per cent.) in two fields surrounding wilted plants became diseased. The seed stock used in this experiment must have contained a trace of wilt in 1938, which increased to 2·5 per cent. external infection in 1939, involving on the basis of the data obtained at harvesting a minimum of 18 per cent. diseased tubers. The substantial amount of upward spread along the row and across two rows, in addition to the downward course of infection, can hardly be accounted for by irrigation water alone and the implication of the locally prevalent flea-beetle [*Epitrix cucumeris*] is suspected.

Schaal (L. A.). **Variations in the tolerance of certain physiologic races of Actinomyces scabies to hydrogen-ion concentration.**—*Phytopathology*, xxx, 8, pp. 699–700, 1 fig., 1940.

Two strains of *Actinomyces scabies*, designated Nos. 23 and 66, were isolated from potatoes growing in soils of P_H 6·8 and 5·4, respectively, in Minnesota. Neither made any growth on potato dextrose agar at P_H 4·5, No. 66 developed freely at a range of P_H 5 to 8·5, while No. 23 only grew sparsely at 5·5 but equalled No. 66 at P_H 6 to 8·5. In comparative tests with seven isolates from the United States and one from Australia, No. 66 was the only one to grow readily at P_H 5 on the medium selected.

In inoculation experiments on Green Mountain and Katahdin tubers, No. 66 produced shallow, blister-like pustules, whereas No. 23 caused the formation of deep, severe-type pustules [*R.A.M.*, xix, p. 111] on

the same varieties in soil with a reaction of P_H 6·8. The degree of pathogenicity of No. 66 in soil with a hydrogen-ion concentration of P_H 6·8 was practically the same as 5·4, the reaction of its site of origin, so that in this case soil reaction does not appear to have been a factor in the determination of pustule type. Generally speaking, field reactions below P_H 5·4 are exclusively associated with the shallow type of scab.

The results of these experiments are considered to point to the existence of physiologic specialization in *A. scabies* [ibid., xvii, p. 412].

HAYASHI (T.). **Biochemical studies on 'bakanae' fungus of the Rice. Part V. Effect of gibberellin on growth, fermentation and size of yeast cell. Part VI. Effect of gibberellin on the activity of amylase in germinated cereal grains.**—*J. agric. chem. Soc. Japan*, xvi, 5, pp. 386–388; 6, pp. 531–538, 4 graphs, 1940. [Japanese, with English summaries on pp. 84, 103.]

Gibberellin, the active principle of the 'bakanae' (elongating) fungus of rice [*Gibberella fujikuroi*: *R.A.M.*, xix, p. 363], was found in the writer's experiments at the Imperial Agricultural Station, Hongo, Tokyo, to be without effect on the growth, fermentation, or size of yeast (*Saccharomyces cerevisiae* and *S. pombe*) cells. On the other hand, it stimulated the germination of hulled and naked barley, wheat, and rice grains and the amylase activity of those of germinated barley and wheat.

[Part IV of this series of investigations, entitled 'The cultural conditions for producing gibberellin or fusaric acid' by T. YABUTA, Y. SUMIKI, & S. UNO appears (in Japanese only) in the same journal, xv, 12, pp. 1209–1220, 1940.]

HEUBEL (G. A.). **Tapvlakziekten en tapvlakziektenbehandeling van Hevea brasiliensis. II.** [Tapping surface diseases of *Hevea brasiliensis* and their control. II.]—*Bergcultures*, xiv, 32, pp. 1005–1014; 33, pp. 1036–1045, 1940.

This is a useful summary of the knowledge at present available concerning the diseases of the tapping surface of *Hevea* rubber and their control in the Dutch East Indies. Reference to most of the investigations on which the information is based has been made at frequent intervals in this *Review*. A special feature of this contribution is a table showing the water content, boiling point, emulsibility, and retail price as at 31st May, 1940, of some brands of carbolineum now on the market.

GORDON-DUFF (D. C.). **Oidium in relation to replanting in mid-country.**—*Quart. Circ. Ceylon Rubb. Res. Scheme*, xvii, 2, pp. 131–141, 1940.

In discussing the effect of *Oidium* [*heveae*] on the planting of *Hevea* rubber in Ceylon the author expresses the view that the disease should not deter anyone from replanting old rubber in mid-country zones (from elevations of 800 to 1,500 ft.). The fungus is thought not to hibernate [but see *R.A.M.*, x, p. 270] and no resting stage is known. Instances of dissemination of spores by wind are cited and windbreaks are said to reduce the spread of infection. The use of fertilizers is considered to induce a more rapid recovery of the trees from the effects of infection.

In dusting, the author obtained good results with beacon curative and preventive sulphur mixed (1 : 3) with a sulphur powder of high sulphur content; the former product is very low in sulphur, but contains a considerable amount of mud, which acts as a sticker. The author considers that dusting gives the best results when frequent small applications are made. With a carrying machine one supervisor and eight labourers can dust about 100 acres in a day, whereas using mechanical transport in an area with good roads 500 acres can easily be treated by one supervisor, one driver, and one labourer in four hours. In a badly infected area the cost of sulphur control in the first two years amounts to not more than 1 to 1·2 rupees [1*s.* 6*d.* to 1*s.* 9½*d.*] per acre per year. In old, badly infected rubber, the maximum cost was 4·53 rupees [6*s.* 9½*d.*].

Schuster (R. E.) & Stephenson (R. E.). **Sunflower as an indicator plant of boron deficiency in soils.**—*J. Amer. Soc. Agron.*, xxxii, 8, pp. 607–621, 3 figs., 1 graph, 1940.

Sunflowers grown on various soils deficient in boron at the Oregon Agricultural Experiment Station developed foliar abnormalities, the terminal buds ceased growth, and dry weight was reduced. The affected plants also suffered severely from mildew [*Erysiphe cichoracearum*] during August and September, 1936 and 1937, while those given boron showed little or no infection. Humus depletion appeared to aggravate boron deficiency, which was corrected by the admixture of appropriate quantities of compost.

Available boron is usually most plentiful in the upper 3 ft. of soil, the shortage below this depth frequently being extreme, especially in eroded soils, such as the Melbourne series derived from sandstone.

Piper (C. S.). **The symptoms and diagnosis of minor-element deficiencies in agricultural and horticultural crops. Pt. II. Copper, zinc, molybdenum.**—*Emp. J. exp. Agric.*, viii, 31, pp. 199–206, 1 pl., 1940.

Most of the work referred to in the author's summary of the symptomatology and diagnostic features of deficiency diseases of crops [cf. *R.A.M.*, xix, p. 486] associated with the lack of available copper and zinc in the soil has been noticed from time to time in this *Review*. Molybdenum has only recently been added to the list of elements essential for growth, and so far no naturally occurring disease has been attributed to its absence, but the writer has ascertained the need for traces (0·02 mg. per l.) of the mineral in the nutrient solutions of oats to prevent the development on the upper leaves, at an advanced stage of maturity, of pale reddish-brown or rust-coloured lesions, followed by the death of the plants, which produced only shrivelled grain. Similar results were obtained by Arnon (*Soil Sci.*, xliv, pp. 91–121, 1937) in experiments on barley and (in collaboration with Stout) on tomato, the latter when deprived of molybdenum showing a characteristic mottling, necrosis of the leaf margins, and involution of the laminae.

Jacks (G. V.) & Scherbatoff (Miss H.). **The minor elements of the soil.**—*Tech. Commun. Bur. Soil Sci., Harpenden*, 39, 86 pp., 1940.

Most of the sections in this revision of a previous publication by the same authors entitled 'Soil deficiencies and plant diseases' [*R.A.M.*,

xiv, p. 469] have been entirely rewritten, with more stress on the distribution and reaction of the minor elements (to which cobalt, selenium, iodine, molybdenum, chromium, and thallium have been added) in the soil, and relatively less on the physiological aspects of the crop disorders associated with their absence. A few instances are also cited of toxicity due to the presence of injurious quantities of minor elements. Some outstanding contributions to the available information on each of the elements are briefly summarized and a bibliography is appended to all the sections.

Vimuktanandana (Y. Y.) & Celino (M. S.). **Anthracnose of Black Pepper (Piper nigrum Linn.).**—*Philipp. Agric.*, xxix, 2, pp. 124–141, 4 figs., 1 graph, 1940.

A full description is given of anthracnose of black pepper (*Piper nigrum*) in the Philippines, caused by the imperfect stage of *Glomerella cingulata*, the conidial dimensions of which (12·2 to 19·2 by 3·5 to 7·0 μ on the host and 10 to 28 by 3·5 to 7 μ in culture) approximate closely to those of the same organism on avocado and mango [*R.A.M.*, xix, p. 663]. Under the humid climatic conditions prevailing in the Los Baños district, the dark grey, yellow-bordered, later nearly black, progressively expanding necrotic lesions may seriously interrupt the normal functions of the leaves on which they develop and cause a substantial depletion in the yield. The disease frequently starts at the tip of the leaf and from thence invades $\frac{1}{3}$ to $\frac{1}{2}$ of the lamina, seriously infected leaves falling prematurely and the plant sometimes being killed. The spores of the fungus may be disseminated by wind, rain, or water traversing the infected areas of the foliage, while the mycelium persists in a dormant state in the diseased tissues during dry weather. The fungus was shown by inoculation experiments to be weakly parasitic on black pepper and only attacked slowly growing, weakened plants. Control measures should include the collection and burning of infected leaves, cultural methods designed to produce vigorous growth and enhance resistance, and partial shading of the vines during the intense heat of summer.

Wiehe (P. O.). **La maladie de la racine sur la P.O.J. 2878.** [Root disease on P.O.J. 2878.]—*Rev. agric. Maurice*, xix, 1, pp. 8–11, 1 fig., 1940.

Examination of the roots of P.O.J. 2878 sugar-canes growing in the Savanne, Grand Port, Flacq, and Moka districts of Mauritius, apparently under favourable soil and climatic conditions, but affected with root disease [*R.A.M.*, iv, p. 569; vi, p. 16], showed the presence of *Heterodera marioni* and (invariably) of *Anguillulina similis*, to which the disease is ascribed. Invasion by these nematodes opens the way for infection by weak parasites, species of *Rhizoctonia*, *Pythium* [cf. ibid., xiii, p. 494], *Fusarium*, and *Penicillium* being frequently isolated. *Pythium arrhenomanes* was found in the rotted roots on several occasions, but in no instance appeared responsible for decline of the whole plant. As a result of root rot the area planted to the variety D/130 [cf. ibid., ix, p. 341] in the northern part of the island has declined from 18 per cent. of the total cane area (in this district) in 1915 to 0·5 per cent. in 1938.

Orian (G.). **Notes préliminaires sur quelques hôtes artificiels du Bacterium albilineans Ashby.** [Preliminary notes on some artificial hosts of *Bacterium albilineans* Ashby.]—*Rev. agric. Maurice*, xix, 1, pp. 12–13, 1940.

Bacterium albilineans, isolated from sugar-cane affected with leaf scald and inoculated into the same host for identification purposes, was then successfully inoculated into maize, *Coix lacryma-jobi*, *Thysanolaena agrostis*, *Cymbopogon citratus*, *Paspalum scrobiculatum* var. *commersonii*, *P. dilatatum*, *P. paniculatum*, *Sorghum halepense*, *Panicum maximum*, *Pennisetum purpureum*, and bamboo (*Bambusa vulgaris*), all these plants developing characteristic symptoms in five or six days, the organism then being re-isolated and again inoculated into sugar-cane, with the resultant development of leaf scald symptoms in every case. As *Bact. albilineans* does not appear able to infect these hosts in nature, they do not constitute any source of danger to sugar-cane.

Abbott (E. V.). **A progress report on the study of chlorotic streak of Sugarcane in Louisiana.**—*Sug. Bull., N.O.*, xviii, 19, pp. 3–6, 1940. [Abs. in *Plant Breed. Abstr.*, x, 4, p. 294, 1940.]

Chlorotic streak of sugar-cane is stated to be spreading in Louisiana [*R.A.M.*, xviii, p. 203], where most varieties are affected, C.P. 29/320 being particularly susceptible. Co. 281 and 290 have so far proved resistant to the disease.

Cooke (W. B.). **A nomenclatorial survey of the genera of pore fungi.**—*Lloydia*, iii, 2, pp. 81–104, 1940.

Following a discussion of the nomenclature of the Polyporaceae a critical analysis of the proposed *nomina conservanda*, in so far as they relate to the Polyporaceae, of the 1935 edition of the International Rules of Botanical Nomenclature is presented [cf. *R.A.M.*, xviii, p. 755], and lists are given of (*a*) 88 recognized genera (with selected types and a key) and (*b*) 131 excluded genera, including *nomina nuda*, homonyms, and synonyms. The bibliography is arranged in chronological order from 1821 to 1939, and the paper terminates with an alphabetical index to the genera.

Hiratsuka (N.). **Materials for a rust-flora of Kiushu.**—*Trans. Sapporo nat. Hist. Soc.*, xvi, 3, pp. 139–146, 1940.

This annotated list of 52 rusts from Kiushu Island, Japan, includes [with Latin diagnoses] two new species, *Milesina chikugoensis* Hiratsuka on *Cyrtomium fortunei* J. Sm. (*Polystichum fortunei* Nakai) and *M. miikensis* Hiratsuka on *Phymatopsis hastata* Kitagawa (*Polypodium hastatum* Thunb.). In neither case was the teleuto stage observed, the fungi being placed in the genus to which they are ascribed because of the characters of the uredo stage.

Săvulescu (T.). **Contribution nouvelle à la connaissance des Urédinées de Roumanie.** [A new contribution to the knowledge of the Uredineae of Rumania.]—*Bull. Sect. Sci. Acad. roum.*, xxii, 2, pp. 1–18, 5 figs., 1939.

This annotated list of Rumanian Uredineae [*R.A.M.*, xvii, p. 556] contains three new species [with Latin diagnoses], including *Puccinia*

callistephi on *Callistephus chinensis*, 16 species not previously recorded for Rumania, and three of rare occurrence in the country. *P. callistephi*, the spots formed by which, when apparent at all on living leaves of *C. chinensis*, are sparse, minute, yellowish or pale chestnut, is characterized by globose, ovoid or ellipsoid yellow to brown, echinulate uredospores, 19 to 28 by 17 to 25 (average 22 to 24 by 18 to 21) μ, and ellipsoid, ovate-ellipsoid, or oblong-ellipsoid, smooth, chestnut teleutospores, 33 to 42 by 19 to 25 (average 36 to 39 by 21 to 24) μ, with a hyaline, persistent pedicel, 30 to 78 by 5 to 9 (45 to 66 by 6 to 8) μ.

Hulea (A.). **Contributions à la connaissance des champignons commensaux des Urédinées.** [Contributions to the knowledge of fungi commensal with the Uredineae.]—*Bull. Sect. Sci. Acad. roum.*, xxii, 4, pp. 1–19, 20 figs., 1939.

Following a general survey of the morphological and biological characters of the group of fungi commonly regarded as parasites of rusts, but believed by the author to be in general merely commensal with these pathogens, a description is given of twelve species occurring in Rumania, including four new ones [with Latin diagnoses], viz., *Darluca filum* [*R.A.M.*, xviii, p. 778] on the uredospores of *Puccinia menthae* on *Mentha longifolia* leaves; *D. iridis* on the uredo- and teleutospores of *P. iridis* on *Iris güldenstaedtiana*; *D. genistalis* var. *hypocreoides* on *Melampsora galanthi-fragilis* on the foliage of *Salix fragilis*, and var. *stromatica* on the uredospores of *P. graminis* on *Agrostis alba*; *Phyllosticta aecidiicola* n.sp., with black, globose pycnidia furnished with an erumpent, brown to fuliginous ostiole, and hyaline, straight or slightly curved spores, 5 to 6 by 2 to 3 (average 5 to 2·5) μ, in company with *Uromyces limonii* on living leaves of *Statice gmelini*; *Ramularia urediniearum* n.sp., characterized by densely fasciculate, hyaline, continuous, flexuous, often subgeniculate conidiophores, 15 to 40 by 2·5 to 3 μ, and cylindrical to ellipsoid, continuous or uniseptate conidia, 9 to 24 by 3 to 4·5 (11 to 18 by 3·5 to 4) μ occupying living leaves of *Cerinthe minor* in association with *Aecidium asperifolium*; *Penicillium uredineicolum*, with conidiophores 3 to 4 μ in diameter, primary and secondary sterigmata, 6 to 12 by 3 to 3·5 and 5·5 to 10 by 2 to 3·5 μ, and concatenate, fasciculate, globose, smooth conidia, 3 to 4 (3·5 to 3·8) μ, on the aecidia of *Puccinia soldanellae* on *Soldanella montana* and of *Melampsora hypericorum* on the leaves of *Hypericum montanum*; *Cladosporium aecidiicolum* on *P. coronata* on *Rhamnus frangula* leaves, *P. circaeae* (teleutospores) on *Circaea lutetiana* foliage, and *P. violae* (aecidia) on *Viola silvatica* leaves and petioles; *Macrosporium uredinis* on the aecidia of *P. violae* on *V. silvatica* and the uredo- and teleutospores of *P. antirrhini* on *Antirrhinum majus*; *Gonabotrys flava*, parasitic on *M. uredinis*; *Colletotrichum uredinophilum* n.sp., with numerous multiseptate, simple, olivaceous to black setae (subhyaline at the apex), 65 to 135 by 4 to 7 (70 to 100 by 4 to 5) μ, hyaline, filiform conidiophores, 18 to 36 by 2·5 to 2·8 (21 to 20 by 2·5) μ, and acrogenous, hyaline, arcuate conidia, 15 to 24 by 2·8 to 3 (18 to 24 by 3) μ, in company with *Aecidium muscaridis* on living leaves of *Muscari botryoides*; *Tuberculina persicina* [ibid., xix, p. 433] on the aecidia of *A. euphorbiae* on *Euphorbia agraria* leaves; and *T. vinosa* on the aecidia of *P. pourum* on *Tussilago farfara* foliage.

Săvulescu (T.). **Péronosporacées, Ustilaginacées et Urédinées nouvelles pour la mycoflore de Roumanie.** [Peronosporaceae, Ustilaginaceae, and Uredineae new for the mycoflora of Rumania.]—*Bull. Sect. sci. Acad. roum.*, xxii, 5, pp. 7–12, 4 pl., 3 figs., 1 graph, 1940.

The present critically annotated list of species new to Rumania [*R.A.M.*, xiv, p. 471; xv, p. 829] includes *Ustilago bromivora* [ibid., xvii, pp. 45, 505] on *Bromus tectorum*, and three fungi new to science.

Christensen (J. J.) & Rodenhiser (H. A.). **Physiologic specialization and genetics of the smut fungi.**—*Bot. Rev.*, vi, 8, pp. 389–425, 1940.

This comprehensive survey, supplemented by a bibliography of 132 titles, covers numerous aspects of the complex problems involved in the physiologic specialization and genetics of the smuts. Most of the contributions to which reference is made were noticed in this *Review* as they appeared.

Arwidsson (T.). **A short note on parasitic fungi from the Azores.**—*Bot. Notiser, 1940*, 2, pp. 237–239, 1940.

This is a critically annotated list of 11 parasitic fungi collected by H. Persson in the Azores in 1937, including *Phyllachora* [*Dothidella*] *trifolii* [*R.A.M.*, xiv, p. 367] on *Trifolium ligusticum* and *T. scabrum*. Eight of the species enumerated are new to the Azores, bringing the total number of records for these islands to 54.

Ito (S.) & Imai (S.). **Fungi of the Bonin Islands. V.**—*Trans. Sapporo nat. Hist. Soc.*, xvi, 3, pp. 120–138, 1940.

This is an annotated list of 56 fungi, chiefly Polyporaceae, found, mostly on living or dead wood, in the Bonin Islands, and including a number of new species and combinations, and one new genus.

Wallace (J. M.). **Evidence of the passive immunization of Tobacco, Nicotiana tabacum, from the virus of curly top.**—*Phytopathology*, xxx, 8, pp. 673–679, 1 fig., 1940.

This is an expanded account of the writer's experiments in California on the passive immunization of Turkish tobacco plants against the curly top virus, a preliminary note on which has already appeared [*R.A.M.*, xix, p. 304]. Intensive studies over a protracted period are stated to have afforded no proof that the infectivity of the virus is in any degree impaired by passage through the insect vector [*Eutettix tenellus*].

Smith (K. M.) & MacClement (W. D.). **Filtration studies on Nicotiana virus 11.**—*Parasitology*, xxxii, 3, pp. 320–332, 1 pl., 7 graphs, 1940.

The authors state that the results obtained over a period of several years by ultrafiltration studies on 17 plant viruses have shown that only tomato bushy stunt and tobacco ring spot viruses behave similarly to the animal viruses studied by Elford [*R.A.M.*, xii, p. 646]. The filtration end points of these two viruses were constant and the results indicated them to be monodisperse suspensions of spherical particles being filtered under optimum conditions. The remainder of the plant viruses studied showed divergence to a greater or less degree from this type of

result and the present paper gives a detailed account of the filtration behaviour of tobacco necrosis virus. The filtration curves obtained by plotting the number of local lesions obtained on French bean (*Phaseolus vulgaris*) against the average pore diameter of the filters (which ranged from 250 to 40 mμ (the filtration end point of the virus), instead of indicating a regular fall in the local lesion count, exhibited a horizontal or slightly rising section between approximately 150 and 65 mμ. Various experiments designed to elucidate this peculiarity in the filtration behaviour are described and the most plausible explanation is considered to be that large virus particles are in process of breaking up into smaller ones, the former being aggregates of the latter. The particle size is computed from the filtration end point to be between 13 and 20 mμ [ibid., xix, p. 669].

Thung (T. H.). **Phytopathologische waarnemingen.** [Phytopathological observations.]—*ex* Jaarverslag 1938–1939. [Annual report for 1938–9.]—*Meded. Proefst. vorstenl. Tab.* 88, pp. 24–28, 1940.

The results of experiments in 1938 to determine the respective effects on cured Chl[orina] ×KW 10 tobacco, inoculated when the plants were a foot ['een voet'] high, of ordinary and mild mosaic in a Vorstenland (Java) plantation [*R.A.M.*, xviii, p. 554] indicated that the former causes a heavy reduction in the percentages of first and second lengths (from 74 for the sound product to 12 in the first harvest, from 90 to 14 in the second, and from 71 to 2 in the third), and first and second grades (from 31 to 9, 17 to nil, and 26 to 6 in the first, second, and third harvests, respectively). The influence of mild mosaic on these characters was relatively slight, the greatest reduction both in length (from 74 to 51 per cent.) and in quality (from 31 to 27 per cent.) occurring in the first harvest.

The colour of the tobacco was also adversely affected by the viruses, ordinary mosaic in particular causing a large increase in the percentage of dun-coloured material (from 34 to 74, 13 to 87, and 16 to 72 in the first, second, and third harvests, respectively). Mild mosaic produced a very detrimental effect on smoking quality.

In a test to ascertain the feasibility of reducing the amount of sulphur applied against mildew [*Erysiphe cichoracearum*: ibid., xviii, p. 555] from 2 to 1 picol [1 picol = 0·6749 q.] per bouw [1 bouw = 0·71 ha.], the larger amount gave noticeably better results in the second harvest only, 81·5 per cent. of the plants in which were healthy compared with 73·4 and 57·8 of those receiving the smaller quantity and no sulphur, respectively.

Johnson (E. M.) & Valleau (W. D.). **Infectivity of Tobacco mosaic virus in liquids over 14 years old.**—*Phytopathology*, xxx, 8, pp. 697–698, 1940.

In January and February, 1940, the writers tested five tobacco mosaic extracts stored in Erlenmeyer flasks since 1925, together with a fresh one, on half leaves of a white Burley tobacco hybrid containing the necrotic factor from *Nicotiana glutinosa*. The average numbers of lesions per half leaf obtained with the different extracts were as follows: (1) frozen mosaic suckers from the field, ground to pulp and mixed with

water, 0·28; (2) air-dried mosaic tobacco leaves crushed and water added, 0·22; (3) suspension of mosaic green leaves ground to a pulp and mixed with water, 5 c.c. benzene added to 200 c.c., 65; (4) and (5) as (3) with the addition of xylene and toluene, respectively, 80 and 1, respectively; (6) fresh extract, 202. In order to avoid any risk of confusion with chemical injury, isolated necrotic spots were removed with a cork borer, crushed in M/10 disodium phosphate, and rubbed on tobacco leaves with a glass spatula, when mottling developed in five to seven days on all the inoculated plants. Benzene and xylene appear to be satisfactory preservatives for tobacco mosaic virus extracts where cold storage facilities are not available.

Stevens (N. E.) & Ayres (J. C.). **The history of Tobacco downy mildew in the United States in relation to weather conditions.**—*Phytopathology*, xxx, 8, pp. 684–688, 1 graph, 1940.

Downy mildew of tobacco (*Peronospora tabacina*) [*R.A.M.*, xix, p. 679] having now been more or less abundantly present in commercial plantings in the United States every year since 1931, before which it had appeared only once in a mild form in Florida and Georgia in 1921, the weather conditions prevailing during the period under review are analysed for their possible bearing on the problem of the origin of the fungus, whether endemic or introduced. Between 1932 and 1939, 1937 was the most favourable year for the development of infection, with 1932 probably second. There is no evidence to indicate that the aggressiveness of the pathogen has fluctuated, or that methods of tobacco cultivation have differed, so that meteorological factors would seem to be responsible for the erratic seasonal behaviour of the disease. A comparison of the temperature and rainfall data for Quincy, Florida, from 1920 to 1939, inclusive, lends no support to the theory that the fungus was present in a quiescent state from 1922 to 1930 and resumed an active form in 1931 with the onset of favouring weather conditions, a more reasonable conclusion, in the writers' opinion, being that the 1931 outbreak represents a fresh introduction from some external source, the 1921 epidemic having failed to lead to the establishment of the pathogen.

Anderson (P. J.). **Control of downy mildew (on Tobacco seedlings).**—*Bull. Conn. agric. Exp. Sta.* 433, pp. 193–206, 1940. [Abs. in *Chem. Abstr.*, xxxiv, 18, p. 6403, 1940.]

The best control of downy mildew of tobacco [*Peronospora tabacina*: see preceding abstract] in Connecticut was obtained by gassing the beds with either benzene or para-dichlorobenzene [*R.A.M.*, xix, p. 619], a minimum concentration of 0·06 per cent. of the former for several hours being requisite. The results given by para-dichlorobenzene were excellent, especially in warm weather, benzene being more reliable when the night temperature drops below 45° F. As little as $\frac{1}{8}$ oz. para-dichlorobenzene per sq. yd. of soil surface prevented infection. The use of medium- to small-sized crystals is recommended, the larger ones evaporating too slowly to be effective [ibid., xix, p. 618].

Moses (C. S.) & Hoffmann (C. H.). **Isolation of Ceratostomella ulmi from Scolytus multistriatus adults stored at different temperatures.**—*Phytopathology*, xxx, 8, pp. 701–702, 1940.

Adults of *Scolytus multistriatus* were contaminated with *Ceratostomella ulmi* [*R.A.M.*, xix, p. 680] and placed in gelatine capsules, which were mixed and divided into 22 lots of 50 each. Two were cultured immediately by a modification of Walter's method (*Phytopathology*, xxv, 1, pp. 37–38, 1935), and four stored at each of the temperatures 70°, 60°, 40°, 28°, and —10° F., one lot from each condition being removed and cultured at the end of 30, 60, 90, and 120 days, respectively. *C. ulmi* was recovered from all the beetles cultured immediately, and from all but two of the ten lots cultured 30 and 60 days after storage. At the end of 90 days only 60 per cent. of the beetles stored at 70° and 58 per cent. of those kept at 60° yielded the fungus, the corresponding figures after 120 days being 0 and 22 per cent., respectively. The pathogen was isolated, however, from all the insects stored at the lower temperatures for 90 or 120 days. In three supplementary lots of *S. multistriatus* stored at —10° the percentages of recovery of *C. ulmi* after 1, 1½, and 2½ years were 100, 98, and 100 per cent., respectively. Storage at —10° was uniformly most satisfactory as regards rapidity of coremial growth and freedom from contaminants.

Seeler (E. V.). **Two diseases of Gleditsia caused by a species of Thyronectria.**—*J. Arnold Arbor.*, xxi, 3, pp. 405–427, 4 pl., 1940.

Thyronectria austro-americana (Speg.) Seeler n. comb. (*Pleonectria austro-americana* Speg., formerly erroneously referred to *Thyronectria denigrata* (Winter) Seaver [*R.A.M.*, xviii, p. 489]), is stated to be responsible for two diseases of *Gleditsia* [*Gleditschia*], namely, a rapid wilt of *G. japonica* at the Arnold Arboretum and a canker of *G. triacanthos* on Nantucket Island. Collections of the fungus were obtained from localities extending over an area from Nebraska to Massachusetts and southward to the Gulf States.

The disease of *G. japonica* is characterized by the sudden wilting of all the foliage in the spring, or yellowing and shedding of the leaflets to the point of total defoliation in later attacks; excessive flower production and fruit setting; bands and spots of reddish-orange discolorations in the sapwood under the bark; and the presence of slender, hyaline strands of mycelium and minute, unicellular conidia in the open vessels of the current ring of wood. Affected trees are killed in a single season. The symptoms of the relatively slow-acting disease of *G. triacanthos* consist of elongated, slightly sunken bark cankers, girdling the branches and causing yellowing and gradual defoliation and death; reddish-orange bands in the wood delimiting the cankered zones; and a profusion of hyaline mycelium in the wood directly underlying the cankers. On both hosts the fructifications of the pathogen soon appear on the surface of the dead bark, the yellowish-brown pycnidia arising on the stromata extruded through the lenticels being replaced in about 1½ years by perithecia. Ascospores were shown to be forcibly expelled from the asci for about 2 mm. into the air, indicating the importance of air currents in the distribution of the fungus.

Healthy two-year-old seedlings of *G. japonica* inoculated with pure

cultures of *T. austro-americana* developed the typical symptoms of sudden wilt, whereas those of *G. triacanthos* exhibited the high degree of resistance anticipated from observations on these trees in nature. Retrocultures from *G. japonica* consistently yielded the original fungus. In culture good growth was obtained on a number of standard media, notably potato dextrose agar; of the twig substrata used, a preference was shown for *Gleditschia*, *Ulmus*, *Fraxinus*, and *Gymnocladus* in the order named.

Sokoloff (D. V.). Итоги фитопатологической экспертизы древесных семян на Ленинградской Семенной Контрольной Станции. [The results of the phytopathological examination of tree seeds at the Leningrad Seed-Control Station.]—*Лесное хозяйство* [*Forest Husbandry*], *1940*, 4, pp. 34–37, 1 graph, 1940.

From 326 samples of tree seeds examined during 1938 at the Leningrad Seed Control Station, 53 species of fungi were isolated on malt agar in Petri dishes. Noteworthy among the 48 species found on broad-leaved trees are *Coniothyrium olivaceum*, *Phoma samorarum*, *Pythium de Baryanum*, *Rhytisma acerinum*, *Sclerotinia pseudotuberosa* [*R.A.M.*, xviii, p. 572], and *S. betulae*, and among the 28 on conifers, *Botrytis cinerea* and *Dematium* [*Pullularia*] *pullulans*, species of *Alternaria* and *Fusarium* occurring in both groups. Of the parasitic fungi, species of the two last-named genera were the most frequently found, *Fusarium* being present in 29, 52, 80, 9, 16, and 0 per cent., of the seed samples of American ash, American maple, oak, pine, birch, and common ash, respectively, and *Alternaria* in 71, 73, 60, 3, 0, and 33 per cent., respectively, of the same samples. *Sclerotinia* [unspecified] was found in all the five samples of oak seeds tested. *Trichothecium roseum* was frequently present on the seeds of conifers and caused a dying-off of the tips of pine and fir seedlings.

Baraney (A. V.). Ложный рак Ясеня. [Pseudo-canker of Ash.]—*Лесное хозяйство* [*Forest Husbandry*], *1940*, 4, pp. 50–52, 3 figs., 1940.

A disease of common ash, caused by a fungus identified by A. S. Bondartzeff as *Endoxylina astroidea* Fr., is recorded for the first time from the U.S.S.R., though the disease is thought to have been present for 30 to 35 years. It is stated to be fairly widespread in the stands of the Vladimirsk experimental centre and other localities in the steppe belt. The fungus [for a description of which the reader is referred to Romell, *Bot. Notiser*, 1892] causes a rot of the pith, which, when the tree is felled, appears in the transverse sections of the trunk as a dark brown, irregular patch with light grey, oblong lesions in it. The rot usually comes to the surface of the stem, where the branches die and break off. Around such places the cambium and the bark soon die and characteristic canker-like lesions develop after the bark falls off. The disease cannot, however, be placed in the canker group, as the rot is not localized but spreads through the whole stem and roots. The coal-black fruit bodies of the fungus appear one or two years after the bark has fallen off. The results of inoculation experiments, conducted during 1938 and 1939, showed that infection takes place through wounds caused by insects or by the breaking-off of branches. The rot

usually starts at a height of about 1 to 1·5 m. and reaches the roots after about 10 to 15 years. Shoots growing from old infected stumps are usually invaded by the fungus from the stump. The disease is more prevalent in stands grown on high and dry ground, where the trees are not vigorous, than in low and moist situations. This fact is important for the choice of localities for new ash plantations. In established stands trees should be examined for the presence of fruit bodies of the fungus and infected ones felled and removed together with old infected stumps.

Cole (J. R.). **Résumé of five years' spraying with low-lime Bordeaux mixture and zinc sulphate to control Pecan scab and rosette diseases.** —Abs. in *Phytopathology*, xxx, 8, p. 704, 1940.

Satisfactory control of pecan scab (*Cladosporium effusum*) [*R.A.M.*, xix, p. 571] was obtained from 1935 to 1939 in south Georgia by four applications of Bordeaux mixture at three- to four-weekly intervals between 10th to 20th April and mid-July, using a concentration of 4–1–100 for the first treatment and 6–2–100 for the later ones. During the period under review, the sprayed trees yielded an average of 55 lb. good-quality nuts, compared with only 10 lb. low-grade from the controls. Rosette [loc. cit.] may be simultaneously combated by the addition of 2 lb. zinc sulphate (analysing approximately 36 per cent. zinc) to the last three Bordeaux treatments, the disease having been completely overcome in two years by this method, and its appearance prevented by the annual admixture of the compound with any of the three final applications.

Boyce (J. S.). **A needle-cast of Douglas Fir associated with Adelopus gäumanni.**—*Phytopathology*, xxx, 8, pp. 649–659, 2 figs., 1940.

This is a critical survey of the available knowledge concerning the needle cast of Douglas fir (*Pseudotsuga taxifolia*) caused by *Phaeocryptopus gaeumanni*. The change in the character of the fungus from a virtually harmless parasite in its native environment in the western United States and Canada [*R.A.M.*, xviii, p. 425] to a virulent pathogen in the north-eastern States [ibid., xix, p. 247] and Europe [ibid., xix, pp. 177, 506, *et passim*] is attributed to the fact that in the latter regions the host is an exotic and consequently predisposed to disease, while the climatic conditions of its new habitats tend to favour the development of the fungus.

Government of India. Department of Education, Health and Lands. Notification. Agriculture.—4 pp., 1940.

Notification No. F. 30–7/37 of 7th June, 1940, introduces the following amendments to that of 20th July, 1936 (No. F. 320/35–A) relating to restrictions on the importation of plants [*R.A.M.*, xvi, p. 496]: the substitution of the name *Fomes lignosus* for *F. semitostus* and of *Dothidella ulei* (= *Melanopsammopsis ulei* = *Fusicladium macrosporum*) for *F. macrosporum* [pathogens of *Hevea* rubber for which certificates of exemption are required]; and of '*Ceratostomella paradoxa* or *Thielaviopsis paradoxa*' for '*T. paradoxa*' [sugar-cane]. A list is given of the countries to which the regulations apply, with the responsible authorities concerned in their administration.

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